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THE APPLIED ANATOMY AND THE INTRA-NASAL SURGERY OF THE ETHMOIDAL LABYRINTH.*

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During the last year I have passed through a revelation in connection with intra-nasal ethmoidal operating. The surgical application of a well-known relationship of one of the anterior ethmoidal cells caused me to look at the labyrinth in a new light and to completely change my operative technic. The suddenness and sharpness of the new conception were startling. Whether you will find the procedure novel in any way I do not know. Neither do I know whether it has been described in the literature. Some of my associates and friends have been kind enough to say that it was new to them, also some of them have had to a certain extent the same operative awakening which occurred to me. I do not mean to give the impression that I am now suddenly thoroughly happy and altogether efficient when working in the ethmoidal labyrinth. I am not, and never shall be; but I can keep my feet better than ever before, and my operative manipulations have changed from a blind opening of cell after cell into a definite and systematic procedure.

An increase of my knowledge of the relationships of the agger nasi cell, the lowest and the most anterior of the cells grouped about the upper part of the unciform groove, led to my operative awakening. In certain animals a turbinate, the naso-turbinal, runs

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beneath the nasal bone and above the maxillo or inferior turbinal. Anteriorly it is attached to the inner surface of the ascending process of the superior maxilla. In monkeys and man this turbinate is wanting, but a ridge remains to mark its former attachment. In man, about a third of the distance down the unciform groove and in front of it, over the ridge called the agger nasi, there is very frequently an anterior ethmoidal cell, called from its position the cell of the agger nasi. This cell drains backward into the unciform groove. Not rarely two cells are found at this point. This cell is covered by the anterior attachment of the middle turbinate where this bridges across the upper part of the unciform groove. When this cell is of any size, the mound which it makes on the upper part of the inner surface of the ascending process of the superior maxilla is readily made out in the nose of the living subject. For years this cell has stared me in the face in anatomical preparations. A short time ago it occurred to me to begin the opening of the ethmoidal labyrinth by passing a curette into it. I did so, and found that the head of the curette was at once in a sizable cavity. A probe carried into this entered the frontal sinus with great ease. The same thing happened in other specimens and kept on happening during the next few excited weeks until the procedure had proved successful for catheterizing the frontal sinus in fifty out of fifty-three heads. As the frontal sinus cannot be catherized by the anatomical route in any such proportion of cases, and as the usual operative procedures for catheterizing the sinus are not successful in anything like this percentage, I began to try this manipulation on the living. The results were almost as successful as they were on the dead. It was soon found that the procedure was an easy and sure way of exenterating the anterior ethmoidal cells, and that a slight and natural extension of the manipulation accomplished the same thing in regard to the posterior cells.

The foregoing somewhat long and personal paragraph will serve, with your permission, as an introduction to this paper. The purpose of the article, then, is to review the applied anatomy of the ethmoidal cells, to describe the position and the form of the naso-frontal duct, and then to outline a definite and systematic plan of exenterating the ethmoidal labyrinth by the intra-nasal route. Throughout this article I shall dwell only on the anatomical points which bear upon the purpose of the paper.

The Position of the Ethmoidal Labyrinth: The ethmoidal labyrinth is placed outside of the cribriform plate and rises an eighth

of an inch above it. Posteriorly, the labyrinth is in part free in the nasal cavity and in part united to the front face of the sphenoidal sinus. Anteriorly it is bounded by the posterior and inner surface of the ascending process of the superior maxilla and by

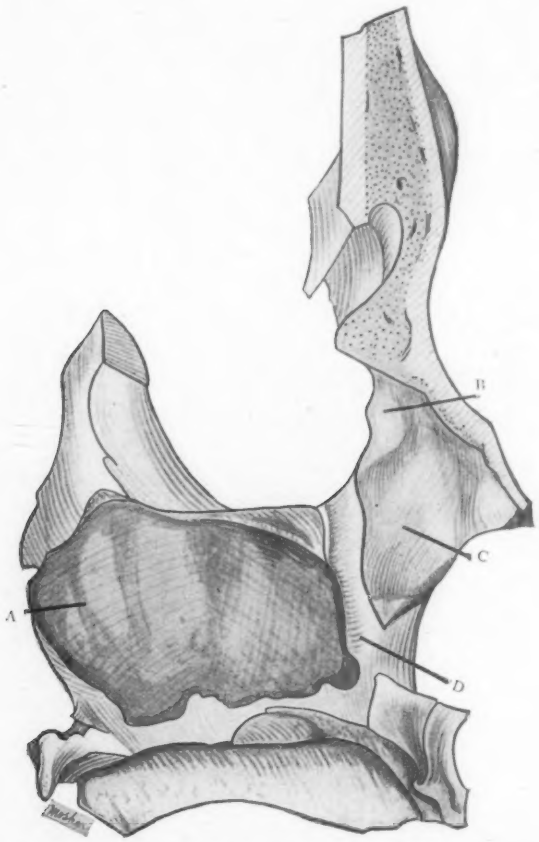


Figure 1. Drawing from a specimen to show the ascending process of the superior maxilla, the agger nasi, and the lacrimal groove.

A. Antrum. B. Agger nasi. C. Ascending process of superior maxilla. D. Lacrimal groove.

the posterior surface of the internal angular process of the frontal bone. Its position in relation to the orbit, the antrum, and the nasal cavity is too well known to call for review.

The Classification of the Ethmoidal Cells: The ethmoidal cells are divided into two groups by the attachment of the middle turbinate. The cells placed in front of this plane are classed as anterior, and those back of it as posterior cells. (Figure No. 2). The attachment of the middle turbinate begins anteriorly in front of the unciform groove, roughly, about a third of the distance down the groove, and in the region of the ridge of the ascending process

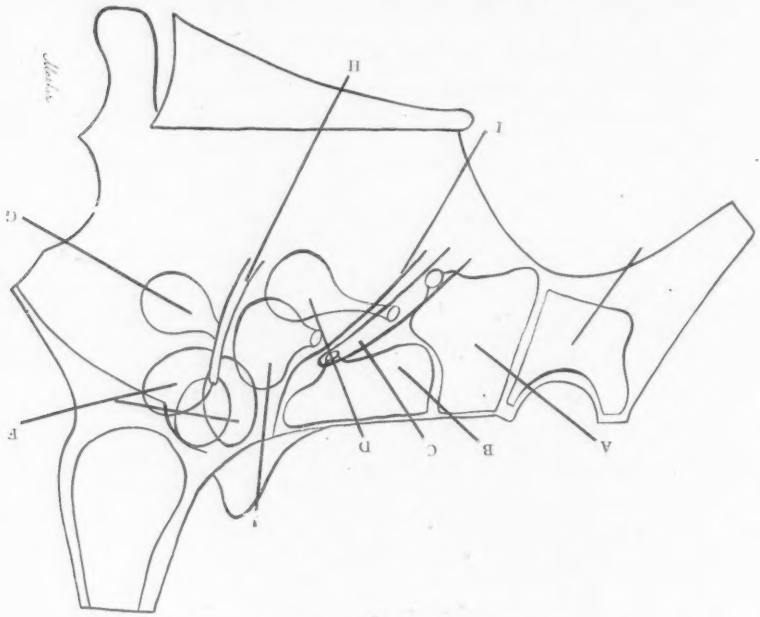


Figure 2. Diagram of the arrangement of the ethmoidal cells.

A. Posterior ethmoidal cell. B. Posterior ethmoidal cell. C. Third meatus. D. Lower cell of ethmoidal bulla. E. Upper cell of ethmoidal bulla. F. Cells at upper part of unciform groove. G. Agger nasi cell. H. Unciform groove. I. Attachment of middle turbinate. J. Sphenoidal sinus.

of the superior maxilla called the agger nasi. After bridging across the unciform groove the attachment of the middle turbinate slants directly downward, making an angle of forty-five degrees with the front face of the sphenoidal sinus. The upper third of the unciform groove is covered by the anterior part of the middle turbinate. The essential anterior cells are on this level.

The Grouping and the Size of the Ethmoidal Cells: Three or four small cells radiate from the upper part of the unciform groove

under cover of the middle turbinate. They suggest in their arrangement the tail fins of a lobster. A third of the distance down the unciform groove, in front, and in the region of the agger nasi there is another cell, the agger nasi cell. There may be two cells in this locality. The posterior boundary of the unciform groove is the oblong sausage-like swelling of the ethmoidal bulla. This consists, as a rule, of two cells, an upper and a lower. The first or the upper cell is in close relationship with the cells which crown the unciform groove. This cell opens posteriorly into the groove

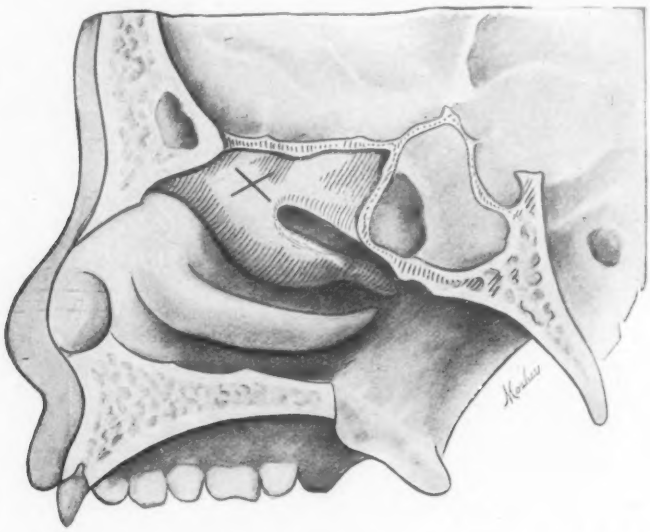


Figure 2. Drawing showing the middle and the superior turbinates. The cross indicates the point at which the curette is carried into the ethmoidal labyrinth. The portion of the middle turbinate below the summit of the third meatus is called in this paper the lower overhang, and the portion above and in front of this point, the upper overhang. The cross is placed on the upper overhang.

of the ethmoidal bulla. The lower of the two cells in the bulla in most cases pierces the attachment of the middle turbinate and drains into the middle of the third meatus.

The third meatus in one-half of the cases is the highest and therefore the supreme meatus. It has three openings classed as upper, middle and lower. The middle opening, as has just been said, in most cases leads to a cell which makes the inferior part of the ethmoidal bulla. The upper opening leads to a cell which runs outward and expands upon the os planum for its base and then

runs upward to the roof of the ethmoidal labyrinth. The inferior opening leads to a cell which, like the upper cell, runs outward to the os planum and there expands and makes its base. (Figures 5, 6 and 7.) Then, like the upper cell, it runs to the roof of the labyrinth and then extends backward to the front wall of the sphenoidal sinus, with the outer part of the anterior wall of which it unites, the outer part of the front face of the sphenoidal sinus and the posterior part of the ethmoidal labyrinth having in this way a common wall.

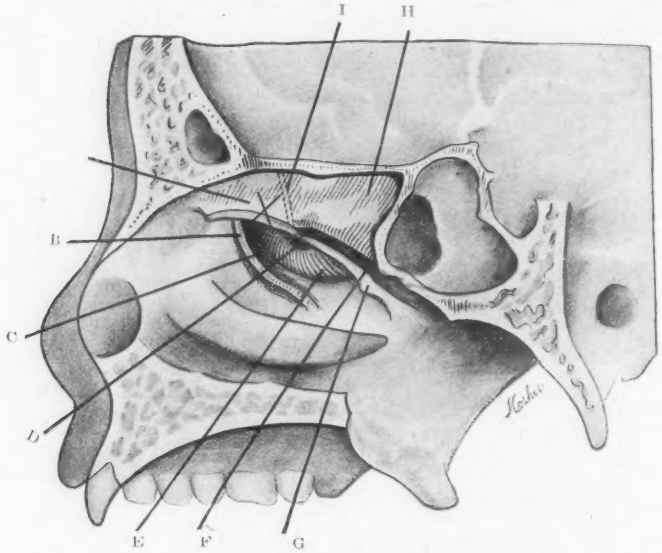


Figure 4. Drawing to show the anatomy of the nose after the middle turbinate has been removed in the usual manner. It is important to notice that the upper anterior part of the middle turbinate is still in place, and that this portion of the turbinate bridges over the upper part of the unciform groove. Removing the middle turbinate in this manner neither completely uncovers the anterior half of the ethmoidal labyrinth, nor opens it. The cross indicates the point at which the curette is carried into the labyrinth.

A. Upper anterior part of middle turbinate. B. Unciform process. C. Unciform groove. D. Groove of ethmoidal bulla. E. Ethmoidal bulla. F. Third meatus. G. Posterior attachment of middle turbinate. H. Superior turbinate. I. Upper part of attachment of middle turbinate.

When a fourth meatus is present there is usually but one cell leading from it. This may monopolize the whole of the common wall with the sphenoidal sinus, or it may take a part and leave the rest for the lower cell of the third meatus. (Figures 8 and 9.) The posterior cell, which is in relationship with the front wall of the sphenoidal sinus, often sends a prolongation backward to the out-

side of the sinus, and at times this is larger than the sinus itself. There are some seven anterior cells, and they are small; there are three or four posterior cells, and they are much larger, especially the most posterior cell, than the anterior cells. It is not unusual to find one or two large posterior cells making up the whole posterior half of the labyrinth. The anterior and the posterior groups of cells are generally distinct, and the partition between them, the attachment of the middle turbinate, is thin and easily broken. I have met with two instances in the dissecting-room and one instance in the living, a case which I saw with Dr. F. P. Emerson, in which the

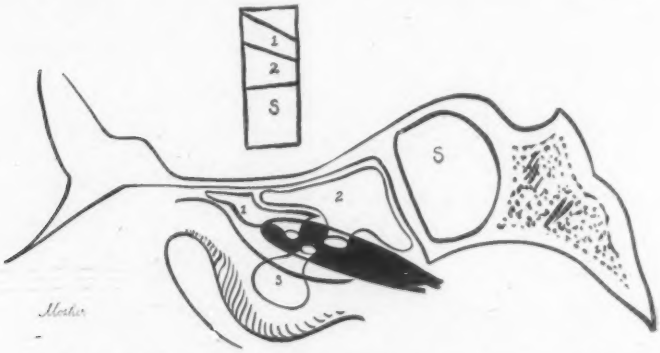


Figure 5. Drawing to show the arrangement of the ethmoidal cells. In this specimen there is no fourth meatus. Cell No. 1 runs outward to the os planum and then upward to the roof of the ethmoidal labyrinth. Cell No. 2 does the same as No. 1, except that posteriorly it is in relation with the outer half of the front face of the sphenoidal sinus. Cell No. 3 pierces the attachment of the middle turbinate and expands in the lower half of the ethmoidal bulla. This happens in 60 per cent of the cases. The arrangement here given is the usual one where there is no fourth meatus. The specimen shows the large size of the most posterior cell, and how little curetting is necessary to convert the posterior cells into a single cavity.

The upper small drawing shows the relationship of cells 1 and 2 to the roof of the ethmoidal labyrinth. The area occupied by the summit of cell No. 2 should be twice as large as given in the drawing.

attachment of the middle turbinate was so strong that no force which one would be justified in using on the living would force a curette through it.

The most posterior ethmoidal cell is in relation not only with the front wall of the sphenoidal sinus, but with the optic nerve and the large veins from the orbit which empty into the cavernous sinus. For practical purposes this makes it in relation with the cavernous sinus itself.

The Naso-Frontal Duct: The conception which I had of the naso-frontal duct was that it consisted of a tube-like canal a half of an inch long, which left the posterior internal angle of the

frontal sinus an eighth to a quarter of an inch from the median septum, and then ran down through the sponge-like anterior ethmoidal cells to the inside of the lacrimal bone, to end in the unciform groove in a quarter of the cases, or in half of the cases to end under cover of the middle turbinate, above and distinct from the unciform groove, the unciform groove in such cases ending in an anterior ethmoidal cell. Thus the canal was surrounded by eth-

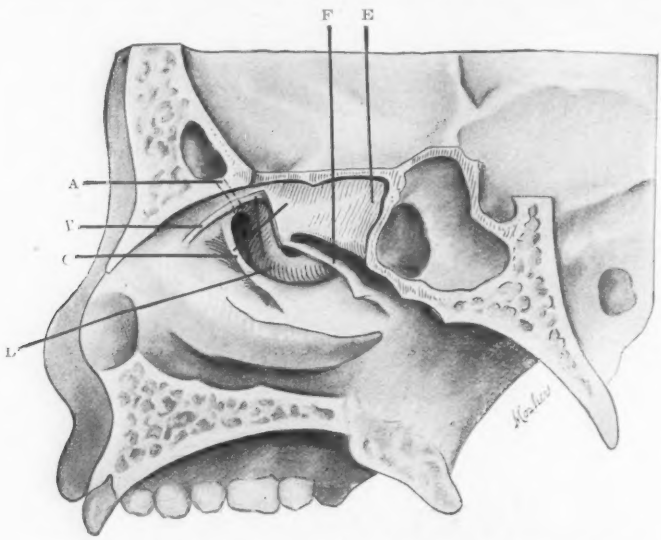


Figure 6. Drawing from a specimen in which the middle turbinate has been completely removed. By the removal of the upper overhang of the middle turbinate the anterior half of the labyrinth has been fully exposed. Compare this figure with the preceding one in which the upper overhang of the middle turbinate is still in place. The usual operative procedure (Figure 4) deals only with the lower overhang of the middle turbinate. The upper overhang (Figure 6) is on a line with the superior turbinate and for practical purposes, continuous with it. In order to enter the ethmoidal labyrinth, and to obliterate the naso-frontal duct the curette must pierce the middle turbinate in the upper overhang and at the level of the superior turbinate.

The cross indicates the place at which the curette is carried into the labyrinth.

A. Naso-frontal duct. B. Attachment of middle turbinate. C. Unciform process. D. Ethmoidal bulla. E. Superior turbinate. F. Attachment of middle turbinate.

moidal cells, which separated to make the duct, and as they surrounded it they could, and often did, mound into it and narrow and distort it. (Figure 10.) On examining the form of the duct, I was surprised to find that in very many cases—I cannot give the figures, because as yet my series is not large enough—there is no

tube-like duct. The only place where it has this form is at the beginning, where it is made by the internal angular process of the frontal bone. At this point there is a definite bony ring. This at once, however, gives way to an antro-posterior slit, which is more like an ethmoidal cell or an irregular meatus. Ethmoidal cells often empty into this at its lowest part. There is a tubular duct only in those cases where an ethmoidal cell is placed in front

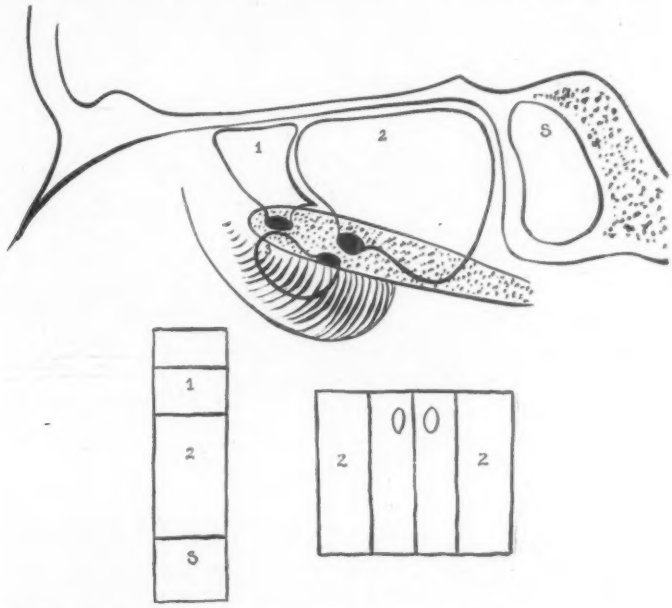


Figure 7. Drawing from a specimen in which two posterior cells make up the major part of the posterior half of the ethmoidal labyrinth. Very little curetting would be necessary to turn the posterior half of the ethmoidal labyrinth a single cavity.

The first small drawing shows the area of the roof of the ethmoidal labyrinth occupied by the summits of cells 1 and 2. The second small drawing shows the area of the front face of the sphenoidal sinus, which has a common wall with the posterior ethmoidal cell. (Figure 2).

and makes its anterior wall. Such a cell is not uncommon, running up in front of the duct as its anterior wall and mounding forward into the inner side of the upper extremity of the ascending process of the superior maxilla, or extending still further upward into the frontal sinus in front and to the inside of the duct to end beneath the middle partition which divides the two frontal sinuses (Figure 11) causing the posterior inferior portion of the middle

partition to balloon outward. Such a formation narrows the duct anatomically, but makes it possible to widen it easily by surgery.

Where an anterior ethmoidal cell does not make the front wall of the duct, the duct, as I said, is slit-like, and more comparable to a cell or a meatus than to a duct. (Figures 12-13.) When this cell-like formation is present its inner wall is made by the anterior end of the extreme upper part of the middle turbinate. As far as my specimens show up to the present time it is commoner to find a cell placed to the outside of the duct than in front of it. (Figure 14.) There may be two cells on the outside of the duct. It is less usual to find a cell on the inside of it. As a rule, the duct is nearer the middle turbinate than the lacrimal bone. However surrounded and related to the cells about it the duct may be, it tends to slant inward and to come into relationship with the inner sur-

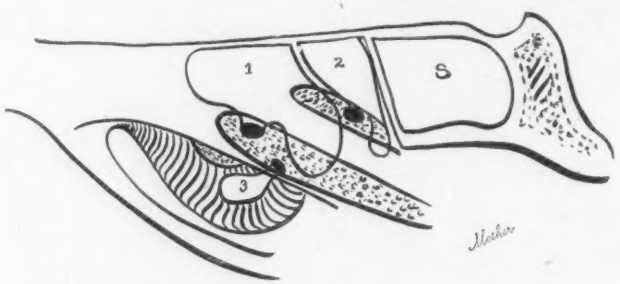


Figure 8. Drawing from a specimen to show the posterior ethmoidal cells In this case two cells lead from the third meatus and one from the fourth. The cell from the fourth meatus has a common wall with the outer half of the front face of the sphenoidal sinus. In a case like this, very little curetting is necessary to turn the posterior half of the ethmoidal labyrinth into a single cavity.

face on the anterior end of the middle turbinate. The duct, therefore, is easier to reach from the nose than from the orbit. (Figures 15-17.)

Catheterizing the Frontal Sinus and Exenterating the Anterior Ethmoidal Cells: In order to catheterize the frontal sinus, the chin of the patient should be tipped up forcibly so that the operator can see the extreme portion of the anterior end of the middle turbinate and as much as possible of the superior turbinate. If the septum is deviated and obstructs the view, it can be forced to the middle line with a short Killian speculum. The point of attack is the agger nasi cell, if it is present and its mound can be recognized; if not, the upper part of the anterior end of the middle turbinate. The external guide to this point is the inner canthus of the eye. In the begin-

ning it is useful to lay the curette on the side of the patient's nose and to measure off on it the distance from the inner canthus of the eye to the lower edge of the ala cartilage close to the cheek. A mastoid curette, with a long handle and a bowl about half a centimeter wide, is the most convenient instrument to work with. (Figures 3, 4, 6.) Having located the mound of the agger nasi cell, or if it is not present having brought into view the anterior end of the

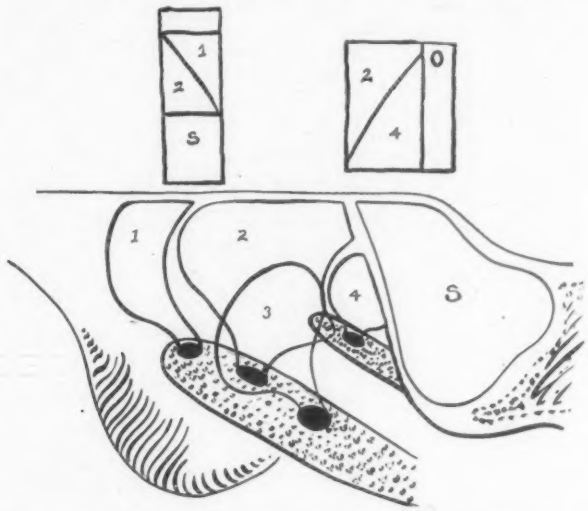


Figure 9. Drawing from a specimen in which both the third and fourth meatus are present. Three ethmoidal cells open into the third meatus, and one into the fourth. The size and the arrangement of the posterior cells is well shown: Cell No. 1 runs outward to the os planum, has its base there and then runs to the roof of the ethmoidal labyrinth. Cell No. 2 is larger, runs outward to the os planum, and then upward to the roof of the labyrinth. It also runs backward and has a common wall with the upper outer half of the front face of the sphenoidal sinus. Cell No. 3 runs outward to the os planum, but does not reach the roof of the labyrinth. Cell No. 4 has a common wall posteriorly with the inner lower half of the front face of the sphenoidal sinus.

The small figure on the right shows the relationship of cells 1 and 2 with the roof of the ethmoidal labyrinth. The small figure on the left shows the relationship of cells 2 and 4 with the front face of the sphenoidal sinus.

middle turbinate, the curette is pushed upward into the olfactory cleft with the cutting edge outward and aimed and then pressed toward the lacrimal bone. If the curette is in the right place it easily enters the ethmoidal labyrinth. If it does not, it should be carried higher and a little further backward. The common mistake is not to go high enough and far enough back. The curette has an allowable outward excursion varying with the labyrinth of a half a

centimeter to a centimeter and a half. If the curette is carried too far it enters the orbit. No harm results, except a slight black eye which lasts a few days. If the operator puts the tip of his finger over the inner canthus he can readily detect the approach of the curette, and if the manipulation is carried out delicately the resistance of the lacrimal bone can be felt. After the initial outward plunge the handle of the curette is brought into the median line and the head of the curette brought into line with the antro-posterior axis of the labyrinth. With the bowl up and the cutting edge downward, the curette is carried backward and downward until the bulla

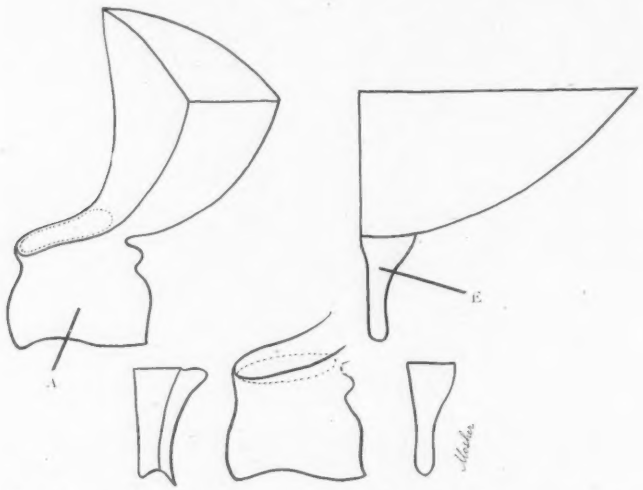


Figure 10. Drawings from casts of the naso-frontal duct. The casts show the duct or a narrow, antro-posterior slit. The naso-frontal duct springs from the floor of the frontal sinus the same as a keel leaves the bottom of a boat. (Large figure on the right).
The three small figures are drawings of the duct detached from the frontal sinus.

A. Side view. B. Rear. C. Side. D. Front. E. View from the front.

has been entered and destroyed. (Figures 19-20.) This means a backward excursion of half an inch. These manipulations leave the anterior end of the middle turbinate in shreds and dangling. This loose part is now cut off with a conchotome. The cutting surface of the curette is turned forward and a little outward and brought forward until the flint-like posterior edge of the ascending process of the superior maxilla is encountered. A few strokes of the curette leave this bare. When this has been done

the anterior portion of the labyrinth stands open before the operator.

Experiments on the cadaver have shown that these manipulations are easily and quickly executed and that they exenterate the anterior ethmoidal cells and obliterate the naso-frontal duct, except for the bony ring where it leaves the frontal sinus. The operator

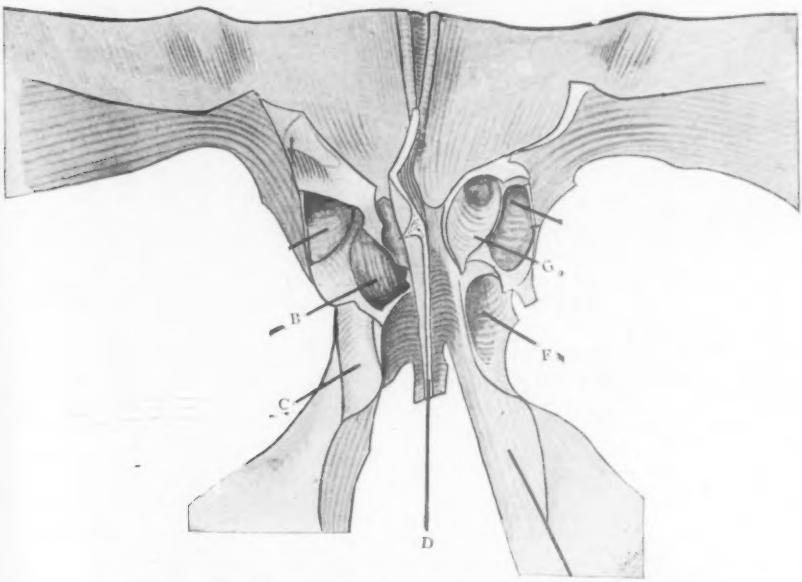


Figure 11. Drawing to show the relationship of the naso-frontal duct to pockets from the frontal sinus and to ethmoidal cells developed in the ascending process of the superior maxilla.

On the left there is a good-sized pocket or prolongation. This springs from the frontal sinus and is below and internal to the duct. There may be a regular cell developed at this place. It is not infrequent to find two such cells. When a prolongation or a cell is present, if the examining probe is carried upward and inward, its point catches in the prolongation. If, however, the point of the probe is directed outwards, the opening of the naso-frontal duct is entered.

On the right the specimen shows two ethmoid cells, the upper one developed in the frontal bone and the lower one in the ascending process of the superior maxilla.

A. Naso-frontal duct. B. Pocket of frontal sinus. C. Lacrimal groove. D. Septum. E. Ascending process of superior maxilla. F. Ethmoidal cell. G. Ethmoidal cell. H. Naso-frontal duct.

can be sure that the opening of the naso-frontal duct is in the roof of the operative cavity thus made. Usually it is placed anteriorly and externally, and the best guide to it is the posterior surface of the ascending process of the superior maxilla. If a probe carried upward and outward along the posterior surface of the ascending

process of the superior maxilla does not drop into the frontal sinus, the probe should be carried further backward and then brought forward still pointing outward. This procedure is necessary when an anterior ethmoidal cell makes the front wall of the naso-frontal duct. When present, such a cell is often broken down by the forward curetting. In a few cases it is necessary in order to find the duct to turn the end of the probe inward. If the probe is turned inward at the start there is danger of getting it caught in a cell on

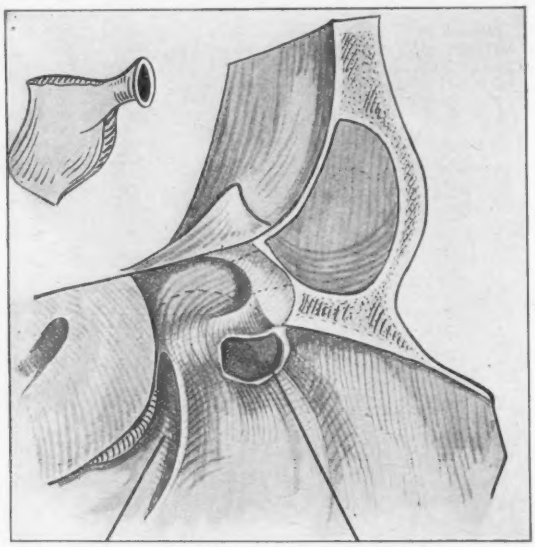


Figure 12. Drawing from a specimen in which the unciform groove ends blindly and where the naso-frontal duct is flask-shaped (small upper figure) and opens above the unciform groove. The inner wall of the duct is made by the extreme upper anterior part of the middle turbinate. This part of the turbinate has been removed—an agger nasi cell lies below the duct and mounds somewhat (dotted line) into it. In this specimen the only real duct is the neck of the flask (parallel dotted lines), the greater part is an antro-posterior slit closed above and behind and widely open below. This formation resembles a rude meatus more than a duct.

A. Unciform groove. B. Agger nasi cell (opened).

the inside of the tip of the ascending process of the superior maxilla, or in a similar cell placed a little higher up and mounding into the posterior part of the median partition of the frontal sinuses. (Figure 11.)

In order to enlarge the duct the head of the curette should be carried upward behind the ascending process of the superior maxilla until it brings up against the roof of the ethmoidal labyrinth, or if

the duct is wide, against the posterior wall of the frontal sinus, where this slopes downward and backward over the orbit. A small curette will enter the posterior part of the sinus, and to carry it upward until it strikes the sloping roof of the sinus posteriorly produces a most uncanny feeling. A lateral x-ray plate gives the operator confidence in this matter, because from this by measurements he can get an idea of the slope and the height of the posterior wall of the sinus. In order to enlarge the duct, therefore, after the curette has been carried upward until it meets with the resistance of

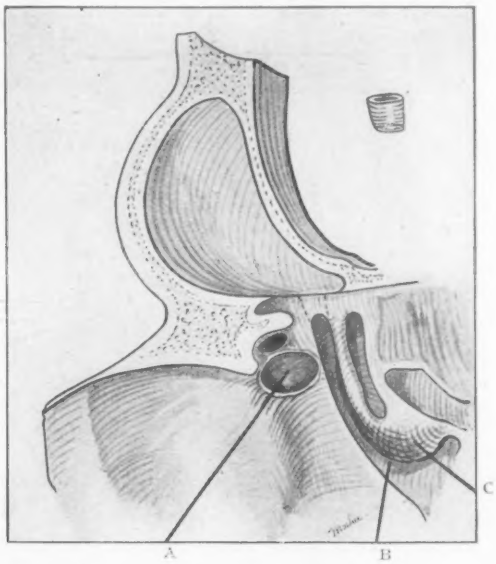


Figure 13. Drawing from a specimen in which the naso-frontal duct is continuous with the unciform groove. The position and size of the duct are indicated by the dotted lines. The small upper figure shows the form of the duct: i. e., the duct is short and tubular. It is but little more than a thickened ring.

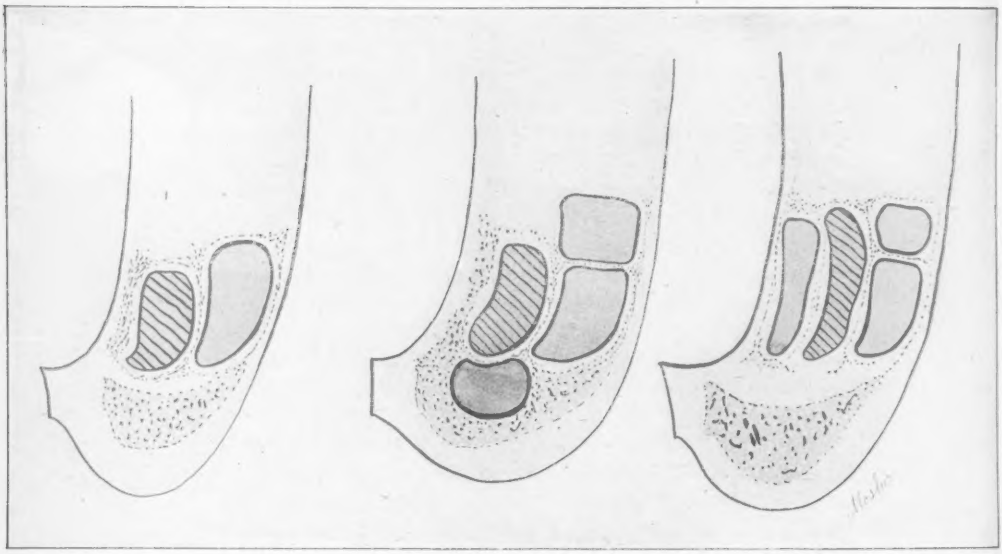
A. Agger nasi cell (opened). B. Unciform groove. C. Ethmoidal bulla.

the posterior wall of the sinus, the bowl is turned outward toward the orbit and brought forward and downward until it brings up against the ascending process of the superior maxilla

If the purpose of the operator is simply to catheterize the frontal sinus and not to exenterate the anterior cells, the initial puncture is made through the anterior part of the middle turbinate and the curette is brought forward until the posterior surface of the superior process of the superior maxilla is curetted free. Then the catheter

is introduced. If the opening of the sinus is not readily found all the anterior cells must be exenterated.

Long before this some of you are wondering about the cribriform plate. The cribriform plate is the roof of the olfactory slit and is to the inside of the middle and superior turbinates. All of the manipulations which have been described so far, and are to be described later, are carried on to the outside of the cribriform plate and inside the ethmoidal labyrinth. The roof of the labyrinth is above and distinct from the cribriform plate.



1 2 3

Figure 14. Three drawings to show the relation of the anterior ethmoid cells to the naso-frontal duct (shaded with parallel lines). 1. There is an ethmoid cells to the outside of the duct. 2. There are two ethmoidal cells on the outside of the duct and one in front of it. 3. There are two ethmoidal cells on the outside of the duct and one on the inside. When any of the above formations exist and the cells extend downward into the labyrinth to any extent it is possible to enlarge the duct by turning the duct and the cells into one cavity. It is the aim of the operative manipulations to accomplish this.

In what way does this procedure differ from the customary one employed in catheterizing the frontal sinus? The plan which I have ordinarily followed was to remove the anterior end of the middle turbinate and then to fish upward and outward with a probe for the opening of the sinus. If this did not succeed I took a conchotome and bit away more or less at random the anterior cells which

presented, and then tried the probe again. It should be remembered that removing the anterior end of the middle turbinate, as it is usually done, does not open the labyrinth. In order to do this, the extreme upper and anterior part of the middle turbinate must be entered and the curette carried outward and behind the ascending process of the superior maxilla. Not to do this is simply to scratch the inner surface of the labyrinth, not to open it. (See Figure 19.)

The Exenteration of the Posterior Ethmoidal Cells: After the exenteration of the anterior ethmoidal cells it is only necessary to

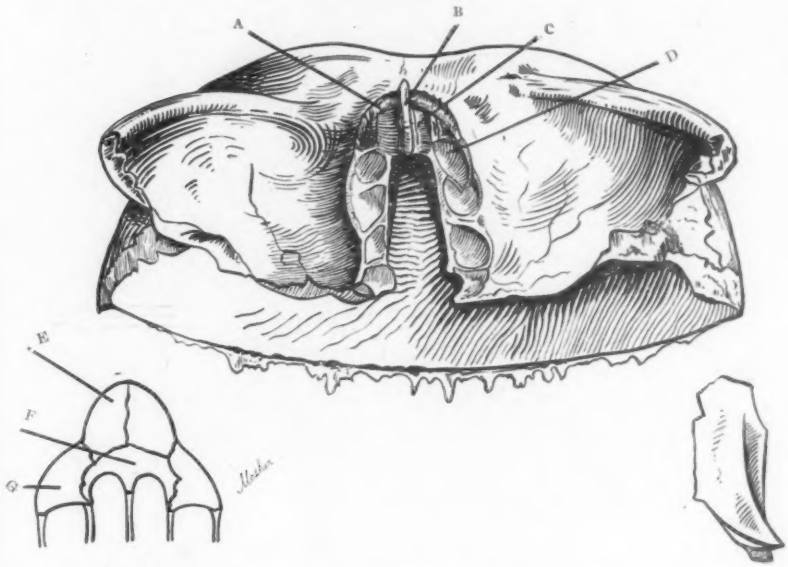


Figure 15. Under-surface of the frontal bone and a cross-section of the nasal bones.

A. Nasal notch. B. Nasal spine. C. Roof of nasal cavity. D. Naso-frontal duct. E. Nasal bone. F. Nasal notch frontal bone. G. Ascending process of superior maxilla.

continue the curetting backward through the attachment of the middle turbinate in order to enter the posterior part of the labyrinth. Before the procedure is attempted it is of the greatest importance to bring the head of the patient downward until the roof of the ethmoidal labyrinth is level. During the manipulations upon the anterior cells the head of the patient was tipped strongly upward and backward, and there is a tendency on the part of the operator to leave the head in this position. To do this causes the

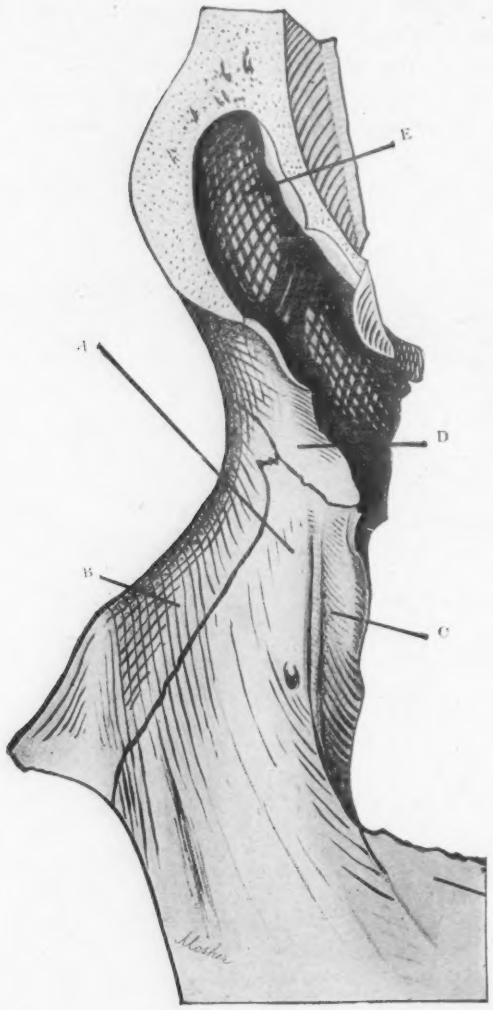


Figure 16. Drawing from a specimen to show the relation of the internal angular process of the frontal bone to the summit of the ascending process of the superior maxilla.

A. Ascending process of superior maxilla. B. Nasal bone. C. Lacrimal groove. D. Internal angular process of frontal bone. E. Frontal sinus.

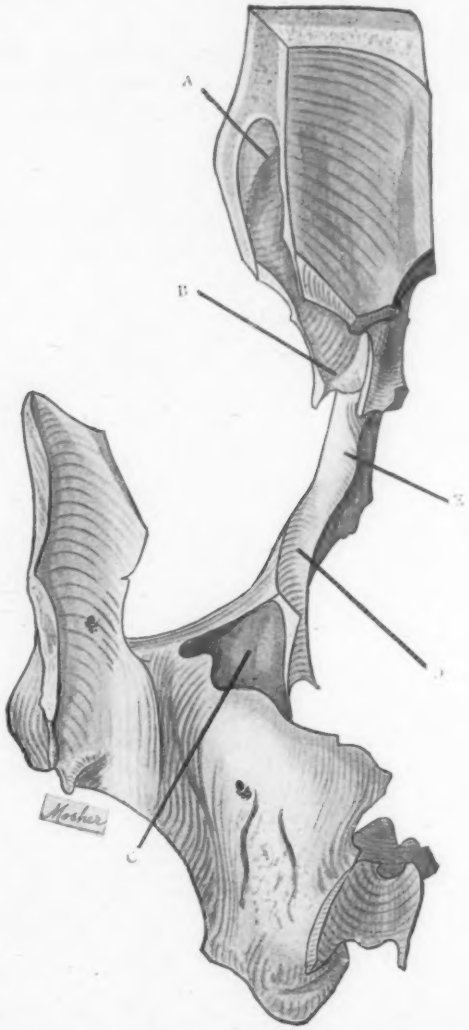


Figure 17. Drawing from a specimen which shows how the internal angular process of the frontal bone makes the anterior half of the opening of the naso-frontal duct and overlaps like a shingle the posterior surface of the ascending process of the superior maxilla. A probe, carried upward along the posterior surface of the ascending process of the superior maxilla is guided by it into the frontal sinus. If the frontal sinus is approached from the orbit the surest way to find the sinus is to remove the lacrimal bone and then to carry a probe upward along the posterior surface of the ascending process of the superior maxilla. In like manner when the frontal sinus is approached from the nose, the operator first turns the anterior cells into one cavity and then in the anterior part of this locates the posterior surface of the ascending process of the superior maxilla and passes a suitably bent probe upward on this as a guide.

A. Frontal sinus. B. Internal angular process of frontal. C. Antrum. D. Lacrimal groove. E. Posterior surface of ascending process of superior maxilla.

operator to lose his orientation, and may, as has happened once, lead to disaster. Therefore, the moment the operator starts to enter the posterior part of the labyrinth, the head of the patient is brought level, and care is taken to keep it in this position for the rest of the operation.

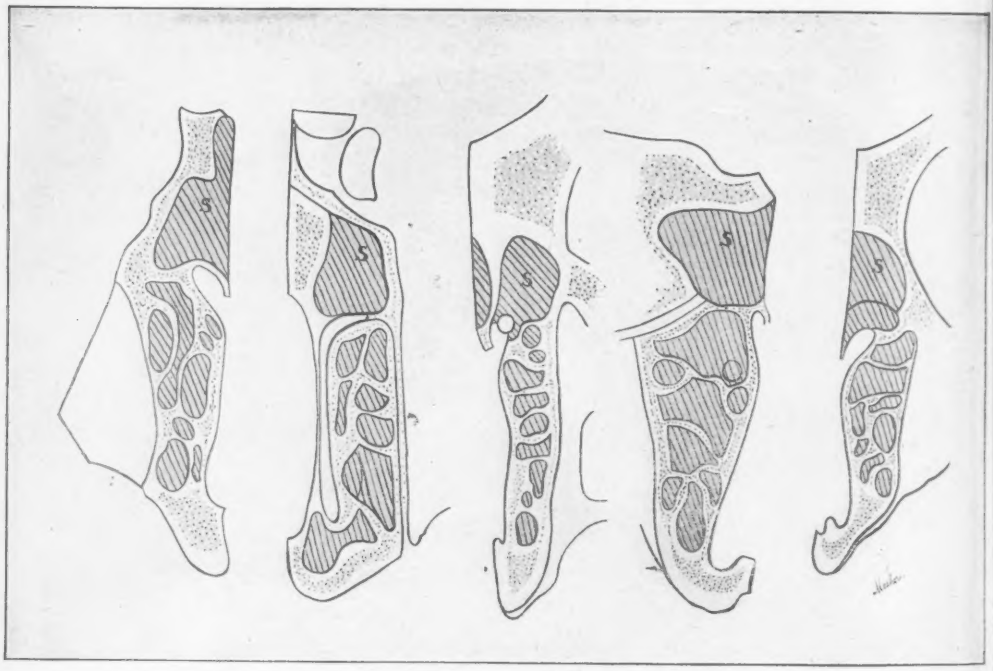


Figure 18. Specimens of the ethmoidal labyrinth cut horizontally. The specimens show the variations in the form of the labyrinth. Each labyrinth tends to bulge toward the septum about three-fourths of the distance back. This inward bulging makes it difficult to see the inner or nasal face of the sphenoidal sinus. In order to do away with this bulging portion of the labyrinth the superior turbinate must be removed flush with the anterior face of the sphenoidal sinus. The third specimen is a narrow labyrinth and the fourth a very wide one.

Having, then, the head of the patient level, the operator plunges the curette through the attachment of the middle turbinate and works slowly backward and downward. In a majority of cases the moment the attachment of the middle turbinate is pierced the head of the curette enters a sizable cavity. This is due to the fact that the posterior cells are much larger than the anterior cells, and that one or two cells not infrequently comprise the whole posterior

portion of the labyrinth. (Figure 6-9.) By this formation Nature has left but little for the curette to do. So roomy is the cavity into which the curette enters that the operator, feeling no bottom ahead fears to carry the instrument onward. After the first case or two, when he has come to realize the large size of the posterior cells, the operator loses his natural timidity and quickly carries the curette to the posterior wall of the labyrinth. The feeling of relief that one experiences when the curette brings up against the posterior wall is

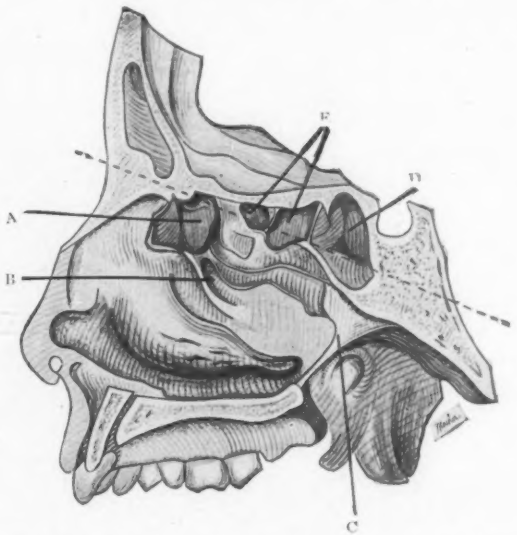


Figure 19. Antro-posterior section through the ethmoidal labyrinth. The middle turbinate has been removed. The anterior cells were destroyed by curetting and a single cavity left. The naso-frontal duct leads from the anterior outer angle of the roof of this cavity. The unciform groove ends blindly below it. There are three posterior cells—two have been opened. The dotted line is the line of a horizontal section which was made through the labyrinth when the dissection had reached the stage shown in the figure.

A. Anterior cells removed. B. Unciform groove. C. Posterior edge of septum. D. Sphenoidal sinus. E. Posterior ethmoidal cells.

much like that which comes to the tired and frightened swimmer when he reaches near enough to the shore for his feet to strike bottom.

The next step in the operation is the removal of the middle turbinate—that is, what is left of it, and the removal as well of the lower half of the superior turbinate. This is accomplished most easily by cutting straight backward as high above the middle turbinate as the scissor-punch can be made to engage. One blade is

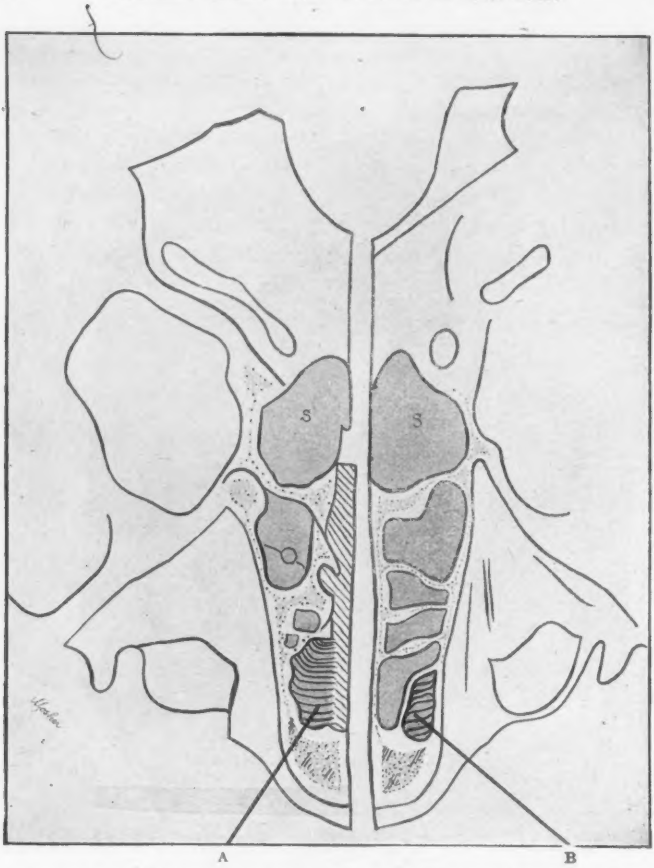


Figure 20. Horizontal section of the ethmoidal labyrinth after exenteration of the anterior cells. (See Figure No. 19).

The half of the figure on the reader's left is the lower half of the ethmoidal labyrinth, and the one on the right is the upper half turned over like the lid of a box.

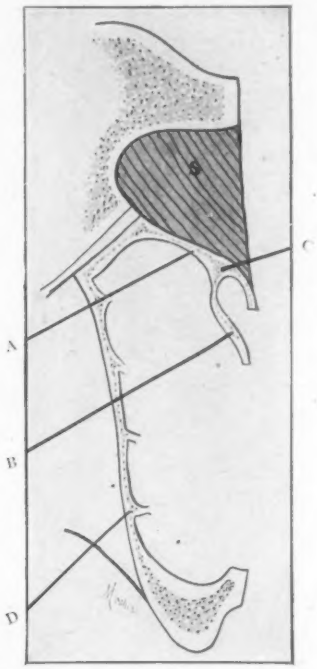
In the first half, the cavity is shown where the anterior cells have been curetted. This in continuous with the naso-frontal duct which is shown in the second half of the drawing. On the inside of the naso-frontal duct an unopened anterior cell (frontal bulla) runs to the inside of the naso-frontal duct and mounds into the floor of the frontal sinus.

A. Cavity left after removing anterior cells. B. Naso-frontal duct.

placed in the exenterated labyrinth and the other follows backward in the olfactory slit. When the scissor-punch has cut its way to the front wall of the sphenoidal sinus, the middle turbinate and the lower part of the superior turbinate are removed with a snare, or are twisted out with a small pair of Luc forceps. If the operator

prefers, the remaining portion of the middle turbinate and the required amount of the superior turbinate can be removed with a conchotome.

The final step in the operation is the complete uncovering of the front wall of the sphenoidal sinus and the recognition of the posterior ethmoidal cell. The hardest part of the operation is to recog-

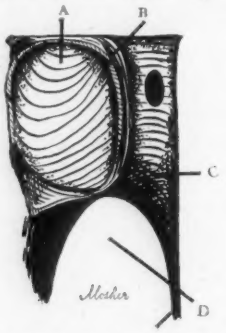


A. Outer or ethmoidal face of sphenoid. B. Attachment of superior turbinate. C. Inner or nasal surface of face of sphenoid. D. Os planum.

Figure 21. Drawing from a specimen in which the whole ethmoidal labyrinth has been exenterated. The posterior third of the superior turbinate has not been removed. This bulges inward and obscures the inner or intra-nasal part of the front face of the sphenoidal sinus. It is necessary for correct orientation in operating to remove the superior turbinate flush with the front face of the sinus. (See Figure No. 6).

nize the limits of this cell. It is in this cell that he can get into the most trouble. Working in this cell, especially in its upper outer posterior angle, is the most dangerous part of the whole procedure. Experience has proved that it can be easily fatal to the patient if the operator loses his bearings in this locality. By carrying the curette backward to the outside of the middle turbinate it must of necessity bring up in this posterior cell. Trouble comes when the head of

the patient is not held level so that the curette strikes the posterior wall at its extreme upper part. If it strikes not only the upper part of this cell, but strikes it at the outer superior angle, it is easy to enter the cranial cavity, especially if the cell wall has been softened by polypi or pus. When, however, the head of the patient has been kept in the proper position, that is, level, the curette meets first the lower part of the posterior wall of this posterior cell. Owing to the bulging inward of the posterior part of the inner wall of the labyrinth, (Figure 21) the front face of the sphenoidal sinus, where it is free in the upper and posterior part of the nasal cavity, is obscured until the posterior part of the superior turbinate has been removed flush with the face of the sinus. (Figure 18.) As soon



A. Outer or ethmoidal half of front face of sphenoid. B. Attachment of superior turbinate. C. Inner or nasal surface of face of sphenoid. D. Right choana.

Figure 22. Diagrammatic drawing of the front face of the sphenoidal sinus. When the exenteration of the ethmoidal labyrinth has been completed and before the sphenoidal sinus is entered the operative field should present the picture given above. The upper outer posterior angle of the ethmoidal face is the most dangerous area in the operation, i. e., the region of the upper left hand marker A.

as this important manipulation has been executed, a very definite and characteristic picture is obtained. To the inside is the septum. (See Figure 22.) Just outside of this comes the free or nasal face of the sphenoidal sinus. This is recognized by the presence of the ostium. Further out and limiting the front face of the sinus is the ridge which represents the attachment of the superior turbinate. Lastly, to the outside of this there is a depression made by the remaining portion of the posterior ethmoidal cell (Figure 22). Once this picture is obtained, however, it is necessary to follow up the removal of the superior turbinate absolutely to the front wall of the sinus. If the operator loses his orientation he can regain it, and he should regain it or abandon the operation, by finding the superior rim of the choana and then advancing upward with a probe close to the septum.

No matter how narrow the inner or nasal part of the front wall of the sphenoidal sinus may be, this procedure will locate it. The wider the posterior cell the narrower is the free part of the front wall of the sinus. The inclination of the operator is to work too high and too far outward, and so to mistake the posterior wall of the posterior ethmoidal cell for the free or nasal wall of the sinus. Having made out the extent of the free wall of the sinus and likewise the extent of the posterior wall of the posterior ethmoidal cell, which is a wall common to the posterior cell and the outer half of the front face of the sinus, the operator selects the inner half of the front face and forces the curette through the ostium of the sinus into the cavity of the sphenoid. If the location of the ostium is not clear, the operator finds the upper rim of the choana and proceeds with his curette up the front wall of the sphenoid close to the septum. Presently the curette finds a thin place and enters the sinus. It seems to me dangerous to enter the sinus through the posterior wall of the posterior ethmoidal cell. When the ostium has been found and the cavity of the sinus entered, a probe bent at a right angle is introduced into the sinus and turned outward and brought forward against the external part of the front face of the sinus and its width ascertained. This will show much of the anterior wall can be removed. With this information in mind the operator introduces into the sinus a small, right angular punch and bites outward, and downward, and inward, until all the thin bone of the front face of the sphenoidal sinus has been removed. The steps of the operation have now been completed. All that remains is to remove tags wherever they are found. It is not well to curette the superior outer angle of the posterior cell. The probe is even more dangerous in this region than the curette, because at this point the wall of the cell is thin. There has been one fatality from a probe entering the cranial cavity at this place. Not only can the probe enter the anterior fossa if used at this point, but it may encounter the ophthalmic veins as they merge with the cavernous sinus. Hitting these veins is practically the same thing as puncturing the sinus itself. As a finishing touch the curette is carried outward to the os planus posteriorly and brought forward along its inner surfaces. In my experience, the os planun is fairly resistant. Where there has been much suppuration there may be dehiscences.

Summary: The anterior boundary of the ethmoidal labyrinth is made by the internal angular process of the frontal bone and the posterior surface of the ascending process of the superior maxilla. The labyrinth cannot be entered effectively unless the curette is carried outward behind the ascending process of the superior maxilla toward the lacrimal bone. Removing the anterior end of the middle

turbinate and curetting upward, and not outward, does not open the labyrinth to any extent. The internal angular process of the frontal bone makes two-third, or the whole, of the bony ring, which is the first part of the naso-frontal duct. (See Figures 16, 17). The best guide to the duct is the posterior surface of the ascending process of the superior maxilla. In a large number of cases the naso-frontal duct is not a tubular canal, but consists first of a bony ring and then becomes a triangular antro-posterior slit. This is more like an ethmoidal cell, or an irregular meatus, than a duct. The naso-frontal duct tends to run from without inward and to come into relationship with the upper part of the anterior end of the middle turbinate. When the naso-frontal duct has the cellform the anterior end of the middle turbinate makes its inner boundary. The duct, therefore, is reached most easily through the nose, and through the anterior end of the middle turbinate. A curette introduced at this point and carried ouward toward the lacrimal bone and then withdrawn a little and carried straight backward and downward, enters the anterior part of the labyrinth behind the ascending process of the superior maxilla and breaks down the cells through which the naso-frontal duct runs, destroying both the cells and the duct. Very little curetting is required to convert the anterior part of the labyrinth into a single cavity. In the roof of this chamber, usually in the anterior outer angle, the opening of the naso-frontal duct is placed.

If it is the wish of the operator to clean out all the ethmoidal cells, the posterior half of the labyrinth is entered by piercing the attachment of the middle turbinate and by curetting still further backward, using all the while the outer side of the middle turbinate as a guide. If the head of the patient is held level, the middle turbinate guides the curette backward into the posterior ethmoidal cell. Often the posterior half of the labyrinth is a large cavity, made up of only one or two cells. This portion of the labyrinth has been, as it were, exenterated by nature. When the curette brings up against the back wall of the labyrinth the remaining part of the middle turbinate and the lower half of the superior turbinate are removed. Then the posterior part of the superior turbinate is taken away, flush with the front face of the sphenoidal sinus. The operator now recognizes the inner part of the front face of the sphenoidal sinus, which is free in the nasal cavity, and the outer part which has a common wall with the posterior ethmoidal cell. The posterior outer upper angle of the posterior ethmoidal cells is dangerous to curette or to probe. It is of the utmost importance that the operator should be sure of his landmarks in this locality. He orientates himself by

finding the upper rim of the choana and then differentiating the free face of the sphenoidal sinus by proceeding upward from the rim of the choana close to the septum. Having made out the extent of the free face of the sinus, the width of the common wall between the sphenoidal sinus and the posterior ethmoidal cell is determined. The dividing line between the two parts of the anterior face of the sphenoidal sinus is made by the obliquely vertical line, which is the attachment of the superior turbinate.

The usual mistake made by the operator is to get lost in the posterior ethmoidal cell—that is, he goes too high and too far outward, and considers the posterior wall of the posterior ethmoidal cell as the whole of the front face of the sphenoidal sinus. This mistake, if persisted in, will carry him into the brain. Insufficient removal of the posterior part of the superior turbinate and allowing the head to become tipped upward, are the chief causes of this confusion. After the landmarks of the front face of the sphenoidal sinus have been cleared and recognized, the sinus is entered near the septum—if possible, through the ostium—and the whole of the anterior wall removed.

The mishaps of the operation are entering the orbit through the lacrimal bone and entering the posterior part of the anterior fossa of the cranial cavity at the apex of the orbit. The first accident is trivial; the second, fatal.

Puncture of the anterior end of the superior turbinate for catheterizing the frontal sinus or exenteration of the anterior ethmoidal cells is readily accomplished under cocain anesthesia. For the complete removal of the anterior and posterior cells, especially if this is to be accomplished at one sitting, it is more satisfactory to use a general anesthetic.

In beginning this paper I used the word "revelation" in regard to my recent increase of knowledge of the ethmoidal labyrinth. I do not expect that the manipulations here described will have any such effect upon you. Many of the points are already known, and many of the manipulations have been—in part, at least—practiced by you. This is a report of individual, though perhaps belated, progress. My ethmoidal operating has lacked definite plan. I easily became confused as to where I was, and was always in doubt how much had been accomplished at any given moment. The anatomy of the naso-frontal duct was especially hazy.

The operative procedure which has just been described has been tried on the living some ten times. The results have been better than any I have secured before.

828 Beacon Street.

PARAFFIN NASAL BRIDGE BUILDING—TECHNIC AND REPORT OF CASES.*

DR. EUGENE VANSANT, PHILADELPHIA.

Paraffin prothesis for the relief of depression of the nasal bridge is generally credited to Gersuny of Vienna, who first employed it in 1900. Since its introduction reports of occasional unfavorable results have been made, such as, deformity resulting from hyper-injection or from the paraffin spreading to a wrong locality; sloughing or abscess resulting from infection; necrosis of the tissue caused by injecting too much paraffin and amaurosis from thrombosis of one of the ophthalmic vessels. The possibility of such accidents may have prevented some surgeons from undertaking the procedure. However, the technic is now so greatly improved that the probability of any such unfavorable results may be said to be very slight. The most important thing in the new technic is the preparation of the paraffin. This is now melted and mixed with white petrolatum so as to bring the melting point to, or slightly above 110° F. Personally, I use a mixture of 116° F. melting point. It is well to have the paraffin prepared fresh for each operation, as the prepared tubes sold in the shops are not always satisfactory.

The following is a brief explanation of the method pursued, as furnished by my chemist: "We use clean, white paraffin—melting point about 135° F.—and a white petrolatum—melting point about 105° F.—and after the proportions used are approximately 437 to 480 parts by weight. After the bases are melted and mixed they are allowed to cool and solidify—and then carefully melted on a water bath to observe temperature of liquifying point. If too high, a proportionate amount of white petrolatum is added to reduce it—and vice versa if too low."

Paraffin prepared by this method can be used cold and injected with great accuracy. Paraffin mixtures of less than 110° F. melting point seem to be more productive of accidents than those of a higher melting point. The screw-syringe devised by Dr. Harmon Smith is perhaps the best instrument for making the injection. As the screw for making the injection is turned the paraffin is ejected from the end of the needle in a worm-like thread. As a general thing a straight needle can be used, but at times a curved needle is preferable.

*Read before the Section of Otology and Laryngology of the College of Physicians of Philadelphia, February 19, 1913.

Before the operation, the nose and face of the patient should be scrubbed with green soap, the area to be operated upon further scrubbed with alcohol and covered with a gauze dampened with a 1-1000 solution of bichlorid of mercury or painted with tincture of iodin. The head should be covered with a towel, dampened with the bichlorid of mercury solution and the upper portion of the body covered with a sterilized gown.

The operator and assistant should prepare themselves as for any minor surgical operation. The paraffin syringe and needle should be sterilized. The paraffin is melted in a cup over a spirit lamp and the melted paraffin drawn into the syringe. The filled syringe is then placed in sterile cold water until the paraffin solidifies. Before using, the screw of the syringe should be turned until the paraffin comes out of the needle in a solid thread free from oil and water.

Figure 1.

Figure 2.

As a general thing, I prefer not to use a local or general anesthetic.

The operator stands behind the patient, who is seated upon a chair. The assistant stands in front of the patient with his thumbs pressing firmly against the nasal bones, with the tips touching the root of the nose. The injection is made preferably from above downward. At the point of injection, the skin is firmly seized and lifted as high as possible. The needle is inserted above the line of depression and carried down through the areolar tissue to a point just beyond the depression. Before commencing the injection, care should be taken to see that the point of the needle is disengaged and that there is no undue bleeding from the point of entrance.

The paraffin is then slowly deposited, the needle being gradually withdrawn, the operator meanwhile molding the paraffin to the desired shape. Marked anemia of the skin over the injected part is a signal of danger and should cause the operator to desist, or at least to proceed cautiously.

Before withdrawing the needle entirely the point of the needle should be grasped through the skin and a slight rotary motion made with the syringe in order to break the thread of paraffin and not to draw it into the skin. Any hemorrhage from the point of entrance should now be stopped and the puncture covered with a little sterilized cotton soaked with collodium. The patient should preferably remain in bed until the next day, with ice cloths to the surface of the nose. He should be instructed not to touch the parts for some days. Usually the deformity can be corrected with one injection but if for any reason it is thought wise not to continue the injection until the entire deformity is relieved, a second injection can be made a month or two later.

The operator should endeavor to conform the shape and size of the rebuilt bridge to the general character of the patient's features.

Figure 3.

Figure 4.

Certainly a Roman nose on Hibernian features would be undesirable.

If the patient is suffering from nasal discharge or ulcerations, preliminary treatment should be given to relieve the condition causing these. A nasal bridge thus restored by paraffin injection seems to be permanent.

The paraffin at the time of the injection is forced into the interstices of the connective tissue; later the enclosing connective tissue-fibers gradually thicken and the restored part has a soft fibrous feeling. The following three cases have been chosen as representing different types of deformity:

Case 1: A young lady, aged about 20 years, gave a history of a blow upon the nose from a fall in childhood, which depressed the bridge of the nose. The deformity had persisted and with the growth of the face had become more marked. The nasal breathing

was good. Her general health was excellent. The patient, however, continually worried about her nasal deformity. Examination showed a depressed nasal bridge, having a deep inward curve, the nose was considerably widened. At the point of depression the cartilaginous septum was wanting. The lower part of the septum was thickened, there was no marked obstruction of either nostril.

Operation, March, 1910. After the proper preliminary treatment before mentioned, about 25 mimims of the paraffin mixture was inserted. This overcame the deformity sufficiently to produce a nasal bridge, the lines of which conformed to the other features of the patient's face. No anesthetic was used, the patient suffered but little pain. There was no inflammation following, the only after-effects being a slight swelling, this passed away in about 48 hours. The patient was photographed before and after the operation. The later photograph was taken about a month after the operation. She was seen at intervals, for months, and the improved nasal appearance remained the same. There was marked improvement in her spirits, and she became much more cheerful and bright.

Case 2: A young man, aged 15, gave a history of a blow on the bridge of the nose from a fall against the edge of a stone step, while quite a young child. The bridge of the nose had remained depressed with a swelling toward the left side. The patient's breathing was greatly obstructed, particularly in the left nostril. Examination showed a marked depression of the nasal bridge, with a hard swelling over the left nostril. This was due to the fact that the nasal cartilage at the time of the accident had not only been depressed but had been also dislocated toward the left. The left nostril was almost completely obstructed by the displaced and deflected septum. The right nostril was partially obstructed by the protruding lower border of the triangular cartilage which was separated from the columnar cartilage.

In January, 1911, the nasal obstruction was removed by means of a submucous operation of the nasal septum with the result of restoring good nasal breathing, and about two months later the depressed bridge was filled in with paraffin mixture, with the result of removing the nasal deformity. The paraffin operation was done without an anesthetic, there was little pain or reaction. The patient's improved appearance and breathing were very satisfactory; he was kept under observation for a number of months and the same excellent condition continued. Photographs taken before and after the operation show the improvement.

Case 3: A lady, aged 40, had depression of the bridge of her nose from necrosis of the nasal septum due to syphilis. There was also a scar on the left side of the bridge of the nose, just below the free border of the left nasal bone, due to former syphilitic ulceration. The deformity was marked, producing the typical saddle-back shape. The patient was greatly distressed about her appearance and was very desirous to have an improvement if possible.

We felt considerable trepidation in undertaking the operation, and only consented to do it after prolonged consultation with her family physician. Assurance, however, of former excellent systemic treatment, freedom of the patient for the past four or five years of any syphilitic manifestation and apparent freedom, as shown by examination, of present active syphilis, finally persuaded us to proceed.

Examination showed the cartilaginous septum to be almost entirely absent. From the nasal bone down to the lateral cartilages there was no support whatever to the bridge of the nose. The operation was performed in June of this year, with the greatest care, about 28 minims of the paraffin mixture was injected, and the appearance of the nose greatly improved. No anesthetic was used, and the patient suffered but little pain at the time of the operation. There was considerable post-operative reaction, and the patient was kept in bed for three days, with cold applications locally and mixed treatment internally. She was then allowed to return to her home, greatly pleased with her improved appearance, saying that her nose now "looked like it used to look." Her family physician in a recent letter assured me of her continued improvement to date.

1929 Chestnut Street.

Case of Total Deafness Following Dose of Quinin. M. J. BALLIN. *N. Y. Med. Jour.*, May 24, 1913.

Girl of 16 took thirty grains of quinin within fifteen minutes. Two hours later severe headache and bilateral tinnitus. No disturbance in co-ordination but steadily progressive deafness, which could not be cured. The case was reported to the author by Prof. Politzer.

ED.

TECHNIC AND AFTER-TREATMENT OF SUBMUCOUS RESECTION WITHOUT PACKING.

DR. L. OSTROM, ROCK ISLAND, ILL.

As early as 1904, while in charge of the nose and throat clinic at St. Mark's Hospital, New York, I noticed that patients who had had submucous septum operations performed and either deliberately pulled out the packing or sneezed (?) it out, recovered more quickly than did those who retained the packing for any length of time (eight to twenty-four hours). In three cases the subsequent swelling and pressure by the packing (not properly done) produced necrosis with loss of mucous membrane and subsequent perforation. About that time I had the opportunity and good fortune to watch and assist Dr. Freer do several operations in his excellent manner. Subsequently I have observed most of our well-known surgeons and have received many valuable ideas and suggestions. In my private work I met many patients who had had partial nasal operations, all of which had been packed that, though they ought to have the septum made straight, most of them would decline because of the dread of the packing. In a few isolated cases I deliberately omitted the packing, but because it was so universally employed I did not feel like risking its omission. However, five years ago, I began to omit the packing, incidentally also to modify some steps of the operation, until to-day I think it absurd and unfair to the patient, and not creditable to the surgeon to inflict a useless punishment. At the 1912 A. M. A. meeting at Atlantic City, I protested against the packing and was astonished that no one else then present had tried the method. Dr. G. D. Richards of Fall River, Mass., was the only one who was acquainted with the method, and that came from European surgeons. Dr. Freer stated that "if anyone wants to let his patient bleed to death, he might leave out the packing." Dr. Loeb stated that he would hold me responsible for patients bleeding to death. I had no opportunity to answer these remarks then, but shall do so now.

The principle reasons for the employment of packing after submucous resection are, prevention of hemorrhage, hematoma and infection. If the technic can be so simplified and perfected that after a moderate amount of experience a resection of a part or all of the bony and cartilaginous septum can be performed without tearing

the mucous membrane to any material extent, then the question of hemorrhage does not come up. It has been found that by resecting through one aperture which can afterwards be completely closed by sutures or pressure, the rest of the mucous membrane not being torn, no hemorrhage can take place. The completed field of operation will then resemble a sac with an opening at one end. Even if numerous small holes are cut in the mucous membrane these will close with blood-clots if there happens to be free bleeding within the septum, but if an extensive tear takes place then packing may be needed to stop the leak. As the blood gathers in the inter-septal space it soon fills it completely and acts as a packing, but when the

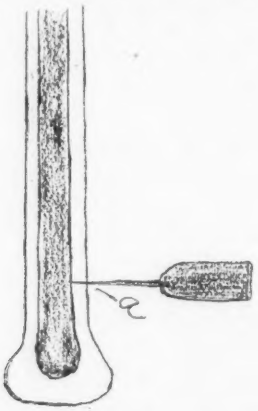


Figure 1—a. Primary incision in mucous membrane at right angle to plane of septum.

bleeding vessels have been closed the inter-septal clot dissolves and flows out through the aperture or is absorbed. Usually it disappears after the third day. About three hours after completing the operation the mucous membrane on the turbinates begins to swell and as the swelling increases on both sides pressure is put on the septum, often so considerable that it resembles a packing. This swelling also helps to squeeze out the blood that may be within the septum.

Hematoma does not occur if there is free drainage. The blood-clot which may form within the septum will soften and escape within one or two days through the primary incision. Furthermore, if the nose has been packed after the operation, when the packing is removed, which is usually long before the mucous membranes have begun to adhere, the inter-septal space is filled with blood or serum

which does not escape with as great ease as it would through the primary incision without packing.

About three years ago, while talking about this same subject with Dr. Ballenger, he told me that he had just been informed by a confrere that a hematoma had occurred after removing the packing. In watching many operators in many clinics, and in their private work, I found the same as in my own practice, that, if the packing remained twenty-four hours, the nose would be swollen shut for the next three to five days, and sometimes longer, with a much greater

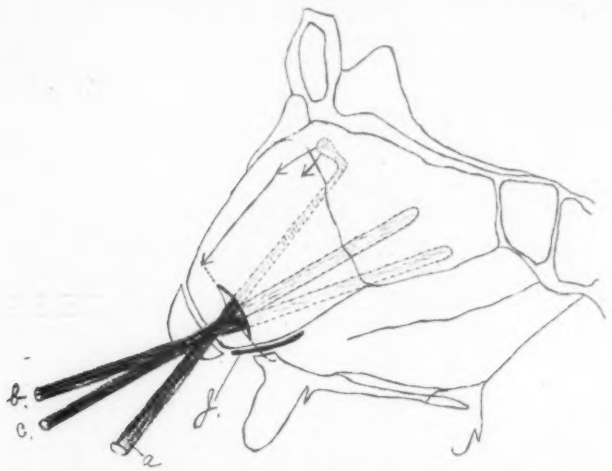


Figure 2—a. Right angle elevator pulling forward toward tip and up to primary incision—b. c. Elevating mucous membrane above vomerian crest. J. Jacobson's cartilage (schematic).

discharge of pus or mucus than when the packing is not employed. This swelling was always due to accumulation of blood or serum between the septal mucous membrane and the swelling of the mucous membrane of the turbinates which by reason of the irritation from the packing and its removal also produced an excess of mucus.

Statements have been made that infection is more apt to occur without packing. It is not likely that packing has any bearing at all on infection. It surely is more safe to allow free drainage than to close up the cavity with packing if infection should take place. I have never had a case of infection of the septum following a submucous resection nor have I seen a case at any clinic. Infections do occur, but so rarely that they might be entirely ignored, especial-

ly if the operation can be performed under favorable conditions and the patient can lend intelligent co-operation.

In an experience of more than 500 cases, no hemorrhage, hematoma, or infection of the septum has occurred, so that theoretically it may seem wrong, practically it has been proved right to omit packing.

In the description of the author's technic, much has been borrowed from different surgeons, a few original suggestions have been added, and the operation systematized to save time and obtain the safest and quickest cure.

The following description is intended for the most complicated overlapping, dislocated and fractured septi. The simple cases need

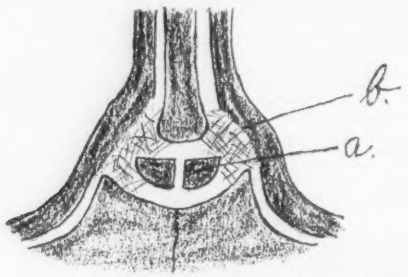


Figure 3—a. Schematic representation of Jacobson's cartilage. b. Fibrous connection to septal periosteum, which should be cut with Steven's tenotomy scissors.

no discussion at this time. Pathology, or the mechanical production of the deformity is not considered.

Position of patient: I prefer to have the patient sitting up during the operation. There is less bleeding and the patient can assist by blowing his nose, etc. I am less fatigued with the patient upright than when operating with the patient in the recumbent position, and the position seems more natural to me.

Time for operation: Usually between 7 and 9 a. m., so that patient may have a full meal in his stomach; the systemic effect of the cocain is less disagreeable, and if anything should arise demanding our attention all day is at our disposal.

Time required for operation: Average time is forty-five minutes, including preparation, operation, and immediate after-care. Many cases have been completed in fifteen minutes; a few cases have taken two hours.

Anesthesia: Flake cocain is used alone, applied three or four times in small quantities, until the tolerance of the patient becomes manifest, and when the patient is fully anesthetized and not sick from the cocain and everything ready for the operation, I then apply adrenalin, not before. I make another application of cocain, and then operate.

In all my experience I have had practically no bleeding during the greater part of the operation; it only occurred when the anterior end of the vomer or maxillary crest was broken or cut, the bleeding from which is easily controlled by pressure for a moment,

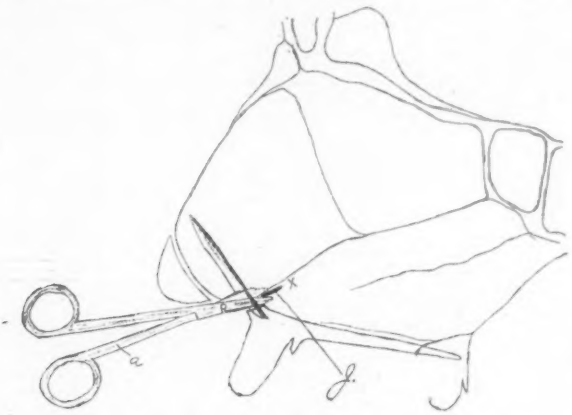


Figure 4—a. Steven's blunt-pointed curved tenotomy scissors, cutting fibrous tissue over suture at incisor crest, and Jacobson's cartilage as far back as x. It can also follow vomerian crest back of x, and cut off edge of spur or ridge without perforating mucous membrane. J. Jacobson's cartilage (schematic).

unless I used the adrenalin too early, in which case I often had very annoying bleeding. I always wait long enough after the primary cocanization to give the patient a chance, if necessary, to get over the nausea or vomiting before using the adrenalin and before operating. It takes a little longer to get started but saves time in the end.

Technic: The primary incision is made about verticle, and one-half inch long, pointing down towards the middle of the incisor crest. This primary incision in the mucous membrane is made at right angle to the surface, (Figure 1 a.), Elevation of mucous membrane is made by first scraping or pushing the perichondrium from the cartilage, so that the cartilage is distinctly visible within the primary incision. The mucous membrane is then elevated back-

wards, above the vomerian crest and up to the upper border of the deflection, (Figure 2 a. b.). With my right-angled elevator, made for me by Ermold, N. Y., in 1903, from a S. S. White dental burnisher, which Ermold bent at right angles and which I am still using, (see THE LARYNGOSCOPE, 1907), I elevate the mucous membrane up to the roof of the nose, below the bridge, and forward to the primary incision, (Figure 2). The primary incision is then extend-

Figure 5. Incision in cartilage at angle of 45 degrees to plane of septum. Finger on other side feels pressure of knife point.

Figure 6. Elevator pushing anterior portion of incised cartilage to left, and the blunt-pointed bent elevator directed against the cartilage. Finger pushes on posterior portion of incised cartilage to right side.

ed upwards to near the roof of the nose, with knife or scissors, (Figure 2), and then extended down to the incisor crest and out about one-eighth inch across the floor of the nose down to the bone, (Yankauer, Figure 2). The periosteum above, below, and over Jacobson's cartilage (Gray, Quain, Gerrish, Figure 3 a.) is separated from the bone and cartilage with Stevens' dull, pointed tenotomy scissors bent on the flat, the points of which hug the bone and cartilage and cut the fibrous tissue connecting the periostium to the sutures at the incisor crest in the region of Jacobson's cartilage,

(Figure 4). This dissection with the Stevens' scissors is continued backwards to the posterior end of the incisor crest (Figure 4 x.), With a dull, narrow elevator the floor of the nose, adjacent to the septum, is elevated as far back as the deflection extends, (Figure 6). By gradually working upwards, the mucous membrane at the angle of the septum with the floor of the nose is elevated up to the edge of the deflection or to the vomerian crest. The mucous membrane, usually very adherent to the edge of the deflection or vomerian crest, is separated in the anterior portion with Stevens' tenotomy scissors, the posterior portion may be left until later, un-

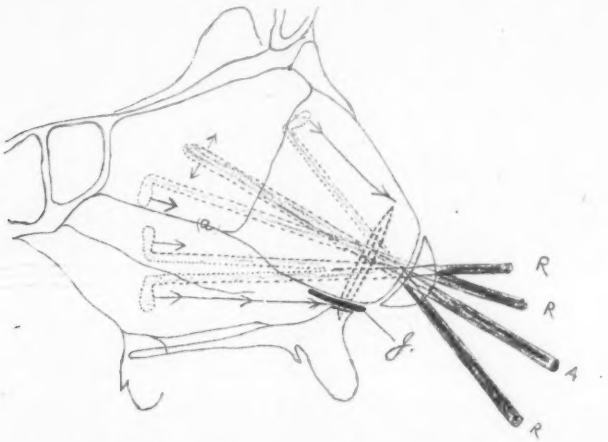


Figure 7—A. Elevation of periosteum on concave side. R. R. R. Right angle elevator used forward after periosteum is raised up, above vomerian crest (a). J. Jacobson's cartilage (schematic).

less nostril is of large size and deflection easily reached. In such a case any elevator will separate the periosteum from the bone.

The incision in the cartilage is as near to the primary incision as deflection demands (usually about one-sixteenth inch behind primary incision in mucous membrane), but at an angle of forty-five degrees to the plane of the septum, instead of at right angles, as in the case of the mucous membrane, and only one-fourth inch long. (Figure 5). One finger is then placed in the opposite nostril behind the incision, on the concave side, and pushes on the deflection so that the incision in the cartilage gapes, (Figure 6). The point of a blue-pointed elevator with the tip bent on the flat is pushed into the incision of the cartilage and while pushing against the car-

tilage anterior to the incision with the bend or heel of the elevator, the tip is directed against or towards the cartilage of the septum (never against or toward the mucous membrane) and as soon as the tip disappears from view the finger in the concave nostril feels the elevation. At this point ocular inspection of the concave side must take place to be sure that the septum was not perforated, cut nor torn. If the elevator is properly insinuated between the perichondrium and cartilage, it is pushed backward as far as the deflection demands and elevates the mucous membrane about one-half

Figure 8—a. Showing direction of connecting fibers of bony septum and periosteum, especially over the vomerian crest and in the region of Jacobson's cartilage. Periosteum most easily elevated from behind forward.

inch in width above the vomerian crest, (Figure 7 a.). My right-angled elevator, (Figure 7 RRR), is then inserted and the periosteum elevated above and forward to the incision in cartilage. The incision in the cartilage is then prolonged upwards to about one-fourth inch from the bridge of the nose. The right-angled elevator is again pushed way back and begins the difficult but, compared to other methods, safe and rapid elevation of the mucous membrane forwards, but must always be in plain view of the operator, (Figure 7 R. R. R.). Remembering that the fibers connecting the vomerian sutures to the periosteum run out and back (Figure 8 a.) by pull-

ing forward, these fibers guide the instrument in against the bone, and no matter how scarred or grooved the concavity of the septum may be, the right-angled elevator separates the mucous membrane from the bone and sutures, way down to the floor of the nose, as far forward as the anterior end of the incisor crest, with no likelihood of perforation. The incision in the cartilage is now prolonged down to the incisor crest. The mechanical reason for using my right-angled elevator so much and using it from behind forward, is, that by resting your fingers on patient's face and pulling forward, you have an absolutely firm and fixed position with great

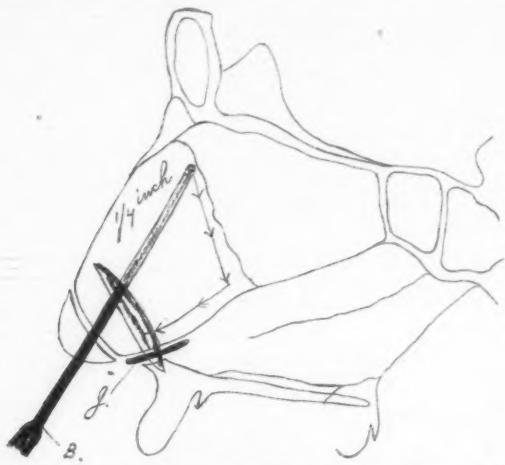


Figure 9—B. Ballenger's swivel knife or straight tenotomy scissors cuts cartilage upwards, parallel to bridge of nose. (¼-inch below bridge). J. Jacobson's cartilage.

power and perfect control of every movement, and to perform a perfect resection absolute control of every detail must be at the command of the surgeon.

Ballenger's swivel knife or a straight tenotomy scissors, is then used to cut the cartilage above, parallel to bridge of nose, (Figure 9 B.) but whatever instrument is used, it never cuts higher than one-fourth inch from the upper border of the cartilage of the septum, or bridge of nose; the rest of the cartilage is removed with one sweep. With Killian's duck-bill forceps, or any other punch or forceps one may prefer, the upper portion of the bony septum (perpendicular plate of ethmoid) is removed as far back and up as the

deflection demands. If the crest of vomer, or the vomer itself, or the vomero-maxillary suture, or maxillary crest is thick, so that it cannot be fractured with some form of forceps, a gauge or chisel is placed against the incisor crest at base of primary incision in mucous membrane, and the vomer lifted up from its attachment with the maxillary bone, or if too thick, scales or pieces of bone are cut away with chisel or forceps, until all the deflection is removed. Often it saves time and is much easier if only the sides of the lower flaring lips of the maxillary crest are removed, leaving the central portion as it normally stands.

When the bony deflection has been made loose above and below, the mucous membrane can more easily be separated from any sharp

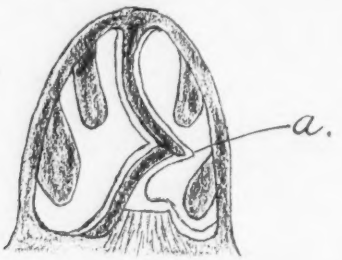


Figure 10—a. Sharp spur to left, cartilage and bone fractured and overlapping. Apex of ridge at (a) may be cut off with Steven's scissors and left attached to periosteum.

ridge, spine, or spur. In cases of long, sharp ridges, with very adherent mucous membrane, the Stevens' scissors will cut off the edge, which is usually cartilage, and this strip is left adhering to the periosteum, if it tears during dissection, (Figure 10a.). The interior is carefully cleared of particles of bone, though I never saw any difference if spicules of bone remained, either in my operations or in the cases of other surgeons—for they amount practically to the same thing as bone-graft.

Usually two black-silk sutures are then placed in the mucous membrane (Figure 11), one in the middle (a), the other at the angles on the floor (b), taken deep in the mucous membrane, so that the cut edges can be well approximated. The advantage of the right-angle cut in the mucous membrane is evident at this point, in that flat edges meet.

A plug of cotton dipped in vaseline-paraffin, is then placed over the incision; this can be removed in a few hours or whenever the

patient wishes, and can be omitted entirely in some cases. The sutures are removed on the third day.

From experience, I have found it absolutely necessary to leave some of the cartilage resting on the incisor crest, because there will otherwise be some recession backwards, at times considerable, and a falling down of the tip with flattening of the nose. This is especially true if the cartilage is removed closer than one-fourth inch from the bridge of the nose, in which case, if absorption of the remaining cartilage takes place, the support to the nose is gone. If, however, more than one-fourth inch is left to support the bridge the anterior support may be removed. The more the septal cartilage is twisted on itself under the bridge, the more must be left to the deformity e. g. modefied Ash or Gluesing, this to be followed later by a resection. In case the incision through the cartilage

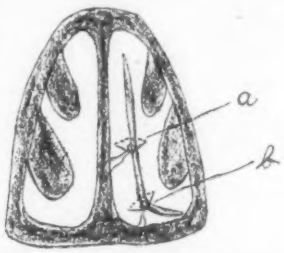


Figure 11. Two suture (a, b) placed in mucous membrane after completed operation.

penetrates the mucous membrane on the other side, make a new incision further back, bevel this more and curve it so that cartilage is left to cover perforation. The best and most comfortable adjunct in a tedious and difficult operation to the surgeon as well as to patient, is a well-trained nurse, who steadies the head of the patient and keeps it in any desired position, whether the patient sits upright or lies recumbent on the operating table, but I have found no need at any time of the services of any one to wipe away the blood if care was taken to follow the above technic in regard to the use of the adrenalin.

This technic will cover nearly every form of deflection, and to illustrate the special points and advantages and rapidity of recovery without packing, a few cases presenting extreme difficulty, or cases that have special bearing on the subsequent healing without packing, will make plain my contention that the packing is superfluous.

Case 1: Miss D., aged 16. Anterior end or tip of cartilage of septum broken, and at right angles with septum dislocated to left of maxillary crest (b). The fractured and dislocated tip of cartilage was incised all around, so that it was freely movable, and all resiliency of cartilage was destroyed. A pin was then run through it, back into the cartilage of the septum and thus retained until union in new position was firm, which took about two weeks, after which a plug of cotton was put in other side, holding it over another week. After two weeks more, a typical submucous resection was performed, as above described. In this case both nostrils were very small and did not permit the use of any but the smallest specula.

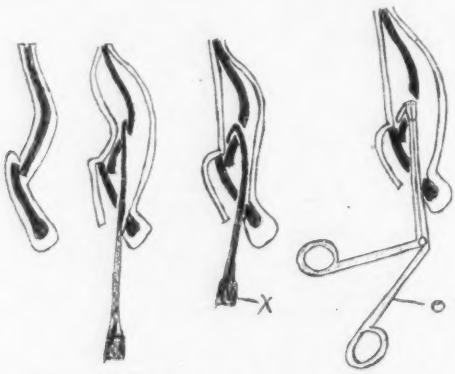


Figure 12. (Case 10). Extreme vertical fracture followed by overlapping. Total occlusion of both nostrils. Schematic drawing explains technic. X. "fish-hook elevator. O. Ostrom's reverse antrum forceps.

Case 2: Mr. V., manufacturer, man whose time was very limited. He was operated on a Wednesday, at duty in his office on Thursday, stitches removed Friday, and in the evening went to New York, to attend to important business, without losing a minute or suffering any discomfort. Mr. V. represents a very large class of business men who need the operation, but cannot spare the time, but with this technic they can almost be assured that they can be at their business in three days.

Case 3: Mr. S., age, 64. Not a good patient on account of age and complicated deflection, demanding very extensive removal of bone. Operation at his residence, with practically no loss of blood and, except for stoppage of nose from after-swelling for the following three days, patient suffered no inconvenience. Mr. S. repre-

sents advanced age, and that class of patients in whom a positive prevention of pain and bleeding is necessary.

Case 4: Dr. B. Extensive removal of nearly all of bony cartilage. Next day after operation made usual calls, and on the fourth day attended to the threshing on his farm in Minnesota.

Case 5: Mrs. L., has been under treatment in the Tri-City Sanitarium for many months; referred to me by Dr. Otis; extremely nervous. The reaction and shock from operation, the worry prior to operation, and the cocain, though there was no evidence of any shock or any effect of cocain during operation, caused patient to be confined to bed for next four days because of headache and nervousness. When I saw her on the fifth day, septum had healed together by first intention; her nose had at no time after the operation been stopped up; there had been no discharge and there was no sign of swelling or scabs on septum. In this case nearly the entire bony septum was removed with primary healing.

Case 6: A. J. A. Total occlusion by extreme deflection of entire septum. An active gumma was present and had partially broken down the mucous membrane, but not the periosteum, on convex side; elevation was made without tearing the periosteum at any point. The vomer and ethmoid was soft and mealy, coming out in large pieces without any trouble. Conditions were present that made it compulsory to operate at this time without waiting for specific treatment. However, specific treatment was started a few days after operation, and the septum as well as gumma was healed in less than two weeks. The patient felt better after operation than ever before, both because of free nasal respiration and specific treatment.

Case 7: G. R., farmer; cartilage dislocated to left side of nasal crest, with a long ridge resting against left lower turbinate and on floor of nostril. Upper portion of cartilage bulged into right side entirely occluding upper two-thirds of passage. Though this was an extremely extensive exenteration, the patient was permitted to take a train two hours after the operation, to Wilton Junction, forty miles away, with perfect safety as regards bleeding. I saw him on the third day, and on the fourth day he was back at work husking corn.

Case 8: Wm. S., aged 13, Verticle deflection of cartilage with horizontal deflection of bone, to right side, with almost total synechia following previous cautery operation by some other doctor. In this case general anesthesia was used. Periosteum over car-

tilage was not perforated at point of synechia, which was first cut, then resection performed, as though no previous surgical injury had taken place. Synechia reformed, but was separated with a probe, and septum remains straight.

Case 9: E. S. (insane). Total occlusion of left nostril, following previous cautery, with verticle deflection of cartilage, and horizontal of bone. Absolute occlusion of both sides. Patient was restrained in hospital for two days following operation, then went home ten miles in the country. The results are perfect, and the patient, though insane at time of operation, and about one month later placed in insane hospital, had no discomfort nor trouble after operation.

Case 10: J. M., theological student. Verticle deflection with over-lapping, almost at right angle to plane of septum (Figure 12), and horizontal deflection of vomer with dislocation. First elevated mucous membrane to end of over-lapping cartilage (Figure 12 a.), then incised cartilage (b), and elevated mucous membrane on concave side (c), where also there was a deep horizontal groove. Incised cartilage behind over-lapping cartilage (d), in concave side. Elevated mucous membrane beyond on convex side (e), and removed the cartilage behind the second incision (d). Then an elevator bent back like a fish-hook (f) elevated the mucous membrane forwards to overlapping ridge without any perforation, and this part of the cartilage was then removed with my reverse antrum forceps (g). Though the septum was at least one-half inch longer in verticle direction, by reason of tremendous deflection, than the distance from the roof to the floor of the nose, and though it was filled with blood-clot after operation, in four days' time most of the septum had adhered, and in one week but very little thickening remained. Operated on Saturday, back in school next Monday. The walls seem to have shrunken, which does not seem to take place when packing is employed.

Case 11: J. A., ex-prize fighter; squashed nose, split cartilage, with obstruction of many years' standing totally occluding nose. In such cases I always leave at least one-eighth inch of anterior edge of septum (c) down to the incisor crest, so that the tip has a good support. I also leave as much as possible above (e), so that the bridge will not sink in. After removing cartilage on one side and intervening tough fibrous tissues (d), cartilage on the opposite side is incised and the mucous membrane elevated backwards then forwards with the "fish-hook" elevator and easily removed with my

reverse antrum forceps, as far forward as needed. A plug of cotton is used in such cases to plug up both nostrils for twelve hours. None of my cases show any evidence of the "squash" two months after the operation.

Conclusion: Adrenalin must not be used until just before you are ready to operate in order to obtain a bloodless operation. The complete primary incision will produce as large an opening as the nostril, and when brought together with sutures, heals with no intervening granulating surface. The mucous membrane must be incised at right angles to surface, and the cartilage incised at an angle of forty-five degrees. Periosteal elevators must always point toward or against the cartilage or bone, never against or towards the mucous membrane. The fibrous adhesions of periosteum to suture at region of rudimentary vomero-nasal or Jacobson's cartilage must be cut, and the bent tip of Stevens' tenotomy scissors will most easily follow the bone and cartilage and not get lost. It is at this region where I have seen laceration of the mucous membrane at every clinic I have visited and the point where scabing keeps up longest if healing must cover a wide gap. Packing cannot be placed uniformly on septum. Usually the upper one-half or one-third is never packed. (My observation at all clinics and numerous operations.) The most painful part of any nasal operation is the post-operative swelling with, and the extraction of, the packing, with the added danger of general sinus infection. Hemorrhage cannot take place unless the mucous membrane is so mutilated that an open wound is produced. Packing will then be necessary to prevent bleeding after operation, but an equally severe or even worse hemorrhage may take place on removal of packing, calling for repacking and repetition of the first trouble. Hematoma does not occur if there is free drainage; all blood will escape from septum in two to five days, usually after the third day. In case of infection, drainage is already prepared for. I have seen no infection of septum after resection. The mucous membrane of the turbinates may be injured by pressure from packing, and especially on its removal, producing synechia. Hematoma (so called) often occurs after removal of packing. With correct technic there is no need of packing. When the mucous membrane is torn to any considerable extent packing should be used.

A SIMPLE SUBMUCOUS LEDGE OPERATION.

DR. RICHARD H. JOHNSTON, BALTIMORE.

The operation of choice for ledges and spurs at the Presbyterian Hospital is one which I have never seen described in any book on diseases of the throat and nose. That an operation which saves mucous membrane is far superior to the saw or the spoke-shave, both of which tear and mutilate the covering of cartilage and bone admits of no argument in modern rhinology. After trying various operation for ledges and spurs, I devised one which I believe will be found ideal for thickenings on the anterior septum. According to the size of the ledge, Hajek's large, medium, or small chisel is selected. This is placed on the membrane in such a position that the cartilage, bone and membrane will be cut through below while the membrane above is left intact in the form of a hinge as it were. After the chisel is driven through the mass, it is withdrawn without making any attempt to force the ledge away from the septum. If the ledge is pushed away from the septum, the next step of the operation is rendered more difficult. We now have a flap consisting of bone, cartilage and mucous membrane, free below, and attached to the septum above. At this stage Freer's sharp elevator is used to lift the membrane from the cartilage, which is usually accomplished in a few seconds. With the flap pushed up and out of the way we are ready to remove the cartilage which is seized with strong forceps and twisted out. If a hump appears above after replacing the membrane a curette or rasp soon removes it, without endangering the membrane. The membrane is replaced, the nostril packed and in forty-eight hours the wound has healed. The operation is more quickly done than by using a knife to cut through the membrane first. The chisel makes a perfect incision of the membrane as far back as the ledge extends. By making use of this simple procedure, one is able in selected cases to dispense with the submucous resection of the septum. It is easy with the curette and rasp to remove all the septum below without injuring the membrane on the opposite side. Then by cutting through the septum above, it can be swung over and held in place by a splint until healing takes place.

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VINCENT'S ANGINA.*

DR. GERARD HUTCHISON COCKS, NEW YORK CITY.

In spite of several excellent articles on Vincent's angina which have recently appeared in medical literature, the majority of practitioners and many laryngologists fail to recognize this disease. The reason lies in the well-nigh universal practice of making the bacteriological diagnosis from the examination of a culture without the aid of a smear. The bacilli and spirilla of Vincent do not grow on the ordinary culture media, hence Vincent's angina cannot be diagnosed unless a smear is made.

These organisms, the fusiform bacillus and spirillum, now generally known by the name of Vincent, were first described by Rauchfus[1] in 1893, in cases of ulcero-membranous angina. In the same year Babes[2] described the occurrence of these same organisms in the gums in scurvy. Plaut,[3] in 1894, described five cases of ulcerative angina. In 1896, Vincent[4] described cases of hospital gangrene associated with the spirillum and fusiform bacillus, and stated that they were also found in ulcerous angina. In 1898, Vincent reported fourteen more cases. In 1897, Bernheim[5] reported a series of 30 cases of stomatitis and angina characterized by the occurrence of the same organisms. In this country, Emil Mayer,[6] Berkeley,[7] Arrowsmith,[8] Halsted,[9] Holm,[10] Oertel[11] and others, have contributed excellent papers on this subject.

Vincent's spirilla and bacilli, in addition to being present in angina and cases of stomatitis, have been found in mastoiditis (Yates[12]), in chronic suppurative otitis media and meningitis (Held[13]), and in abscesses of the lung, liver, and spleen by Schmorl.[14] They have also been identified in a tonsillar abscess by Plaut. Arrowsmith found them in the larynx. They are present about the pulp of carious teeth and are often found in the crypts of diseased tonsils.

Bacteriology:—According to Holm,[10] "the spirilla and fusiform bacilli have been regarded by most writers as two distinct organisms. Recently Ruth Tunnicliffe's studies have apparently proved that the two are different forms of the same organism. The organism is extremely polymorphous and presents many intermediate forms between the typical spirillum and the fusiform bacillus. It

*Read at the annual meeting of the New York State Medical Society, Section on Diseases of the Eye, Ear and Throat, Rochester, N. Y., May, 1913.

stains fairly well with the common stains, and is usually said to stain best with carbol fuchsin. The spirilla are very easily decolorized by Gram's method; the bacilli give up their color less easily. The fusiform bacilli may be readily differentiated from diphtheria bacilli by Gram's method of staining."

According to Berkeley,[7] the spirillum and bacillus of Vincent, like the diphtheria bacillus, micrococcus lanceolatus, and other organisms, occur as saprophytes in the mouth in health.

The number of cases of Vincent's angina encountered in the course of a year depends to a great extent on whether the physician is on the lookout for this particular disease. In one of the large institutions of New York City, the last annual report mentions over 7,000 cases of diseases of the pharynx and naso-pharynx treated in 1912, with but three cases of Vincent's angina. This looks like carelessness on the part of the examining physicians.

Holm,[10] the bacteriologist of the Michigan State Board of Health, reports the examination by culture and smear of 265 cases of suspected diphtheria, which I shall report in detail: Diphtheria bacillus, 118 times; bacillus fusiformis, 73 times; 33 patients were males 40 females. The lowest age was 2 years; the greatest, 55; the average age was 18 years. All but 4 cases had a membrane which involved both tonsils in 38 cases and one tonsil in 31 cases. In 15 cases the membrane extended to adjacent structures. The color of the membrane was described as gray or grayish, in the majority of instances.

Of Holm's entire series of 265 cases, the diagnosis of diphtheria was made on clinical grounds in 99 cases. The bacteriological report of these 99 cases showed B. diphtheria present in 64 cases; absent in 35 cases. These 35 cases of pseudo-diphtheria showed B. fusiformis 27 times. Of the 73 cases showing B. fusiformis, diphtheria was diagnosed clinically 28 times. As a matter of fact, in only one of these 28 cases the diphtheria bacillus was present. In the other 27 cases the diphtheria bacillus was absent. These figures emphasize the similarity, clinically, of Vincent's angina and diphtheria.

Etiology:—Lowered bodily resistance, diseased tonsils, teeth, and gums, act as predisposing factors in the production of Vincent's angina. The exciting cause is the fusiform bacillus and spirillum of Vincent, which are found in almost pure culture at the height of the disease. Vincent's angina is usually regarded as mildly contagious. Mulholland[15] reported twenty-four cases occurring in one ward of the New York Foundling Hospital, in children under 5

years of age. He concludes that the disease is fairly contagious in young children, and that its communicability is favored by institutional life. Curiously enough, none of the nurses who attended the children contracted the disease.

Pathology:—The membrane of Vincent's angina is a pseudomembrane, due to necrosis of the superficial layers of the epithelium (Ballenger[16]). This membrane is usually gray or grayish white. If the membrane is removed, an ulcerated spot is seen, which bleeds easily when touched with the cotton applicator.

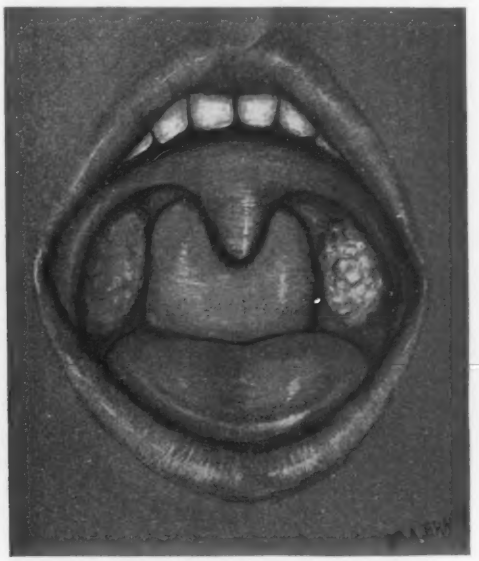

Figure 1. Vincent's angina, left tonsil.

Vincent's angina may be associated with diphtheria and syphilis, and is often accompanied by stomatitis. In February, 1913, Dr. F. E. Sondern[17] read a preliminary report before the Section on Medicine of the New York Academy of Medicine, entitled, "Blood Changes in Vincent's Angina." Dr. Sondern kindly sent me a copy of this paper dealing with the blood changes observed in seven cases of Vincent's angina. In five of these cases the characteristics noted were, "A pronounced relative lymphocytosis on differential count, resembling that of a chronic lymphatic leukemia without the leucocytosis usual in that disease." In the first case, he has records of previous blood examinations which showed normal findings up

to seventeen days before the onset of the Vincent's angina. On the third day of the disease the blood count in this first case was as follows: Red blood cells, 4,800,000; white blood cells, 12,800; hemoglobin, 66 per cent; small lymphocytes, 69.9 per cent; large lymphocytes, 23.2 per cent; polynuclears, 6.9 per cent.

Two of Sondern's cases started as cases of Vincent's angina showing the usual throat lesion and the same relative lymphocytosis without leucocytosis. The condition of these two patients gradually became worse, and the blood picture gradually became that of acute

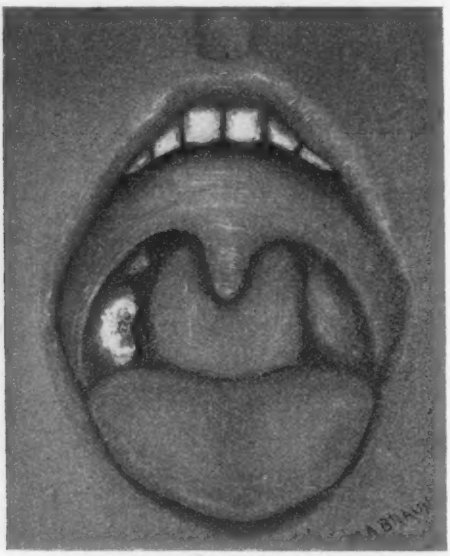

Figure 2. Vincent's angina. Same patient six weeks later, showing recurrence on the right tonsil.

leukemia, from which both patients died. In neither patient, however, did the leucocyte count become very high (32,000 and 49,000). Sondern concludes from these cases that there must be at least a suspicion of a posible relationship between Vincent's angina and lymphatic leukemia. Unfortunately, my own cases were observed before Sondern's report, so I have not yet had an opportunity of verifying these blood findings personally.

Symptoms:—There are two types of cases: First, the mild, or tonsillar type; and, second, the severe cases where the membrane extends to extra-tonsillar structures.

In the mild cases, the patient, usually a young adult, complains of chilly sensations,—rarely, a chill,—at the onset, pain in the tonsillar region on swallowing, perhaps general malaise, and slight fever, 99° or 99.5° F. The submaxillary or cervical glands on the affected side are usually enlarged. These mild cases react readily to local treatment and usually disappear in from one to two weeks.

The picture here shown (Figure 1) shows the throat lesion in a patient with a characteristic history. Joseph D., single, 21 years of age. Twenty-one days ago began to suffer from pain in the left side of his throat on swallowing. He also noticed some swelling of the neck on the affected side, and has been slightly feverish. On examination, the upper two-thirds of the left tonsil was found to be the site of a grayish-white membrane, which upon removal showed an eroded area. A smear demonstrated typical fusiform bacilli and spirilla of Vincent in immense numbers. The lesion yielded in about ten days to local applications of ten per cent silver nitrate. About six weeks later the same patient returned to Dr. Chappell's clinic at the Manhattan Eye, Ear and Throat Hospital with a small patch on the right tonsil (Figure 2). Bacteriological examination again showed Vincent's organisms. The left tonsil, the one first attacked, was normal. As I wished to try the effect of salvarsan in this disease, the patient was given a full dose of this drug, intravenously, and local treatment was withheld. The lesion promptly healed.

The severe cases of Vincent's angina are accompanied by extensive lesions, often involving one or both tonsils, the pharynx, uvula, and soft palate. The breath is very fetid, the pain and prostration extreme. The temperature, though generally said to remain fairly low, sometimes reaches 105° F. (Case observed by Rolleston[22]). Reiche,[21] in a study of twenty-seven cases of Vincent's angina, found the spleen easily palpable in two cases. In six instances it was greatly enlarged. In three patients, traces of albumin were found in the urine. In five urinalyses acetone was found, twice.

A number of fatal cases of Vincent's angina have been reported. Our Secretary, Dr. Halsted, has recently reported two fatal cases in THE LARYNGOSCOPE. Stocklin[23] reports a fatal case in a female, 22 years old, who died from an acute fulminating attack. Bruce[18] also reports two fatal cases, one, an 8-year-old boy with an ulcerous angina of the left tonsil which spread over the entire pharynx. This patient died on the eighth day of the disease. In Bruce's second case, the necrosis extended beyond the thyroid cartilages of the larynx and the child succumbed to broncho-pneumonia. Von

Ellerman[19] and Eichmeyer[20] report severe cases with gangrenous lesions in the mouth, associated with septic complications which were the cause of death. F. Reiche[21] reports a case occurring in a boy, 9 years old, with a pseudo-membrane on the tonsils and tonsillar pillars, which resulted fatally on the twenty-seventh day of the disease, death being due to myocarditis.

Differential diagnosis:—Vincent's angina must be distinguished from diphtheria, syphilitic ulcerations, and streptococcus anginas. The resemblance to these lesions is often striking. The only sure way to differentiate is to make a careful bacteriological examination by both smear and culture. If necessary, a Wassermann test should also be made.

Halsted has called attention to the fact that the deep ulcerations occurring after scarlet fever and diphtheria, due to Vincent's bacillus, are often erroneously supposed to be due to the Klebs-Loeffler bacillus or streptococcus which caused the original disease.

The *prognosis* as to speedy recovery is excellent in the tonsillar cases, which usually clear up in from ten days to two weeks. When unilateral the disease is apt to recur on the opposite tonsil. Recurrence took place in two of the four cases the writer treated during the past year.

In the severe type, the prognosis should be very guarded, as many of these cases show but little improvement with the remedies at our command. Some, as we have noted, even result fatally.

The prophylactic treatment of Vincent's angina embraces care and attention to the condition of the teeth, gums, mouth and tonsils. In the actual treatment of the throat lesion, various antiseptics have been used, such as hydrogen peroxid, tincture of iodin, Lugol's solution, applications of silver nitrate, chromic acid, etc. Orthoform tablets are useful in alleviating the dysphagia. Recently, salvarsan has been used, both locally and intravenously, the theory being that Vincent's angina is a spirillum disease. In the one case where the writer administered salvarsan, the lesion promptly healed. However, this case was such a mild one that it is difficult to judge how much good was accomplished by Ehrlich's compound. Perhaps in the near future some of the members of this section will have opportunities to thoroughly test the efficacy of salvarsan in this disease.

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Plea for Entire Removal of Enlarged and Diseased Tonsils. B. C. GILE, *Pa. Med. Jour.*, June, 1913.

Gile discusses briefly the three chief tonsillar operations (tonsillectomy, obliteration of the tonsillar crypts, and tonsillectomy) and compares them, leaning in favor of the last, though he points out its dangers and disadvantages. Three cases are reported.

ED.

CASE EXHIBITING LARYNGEAL CRISES.*

DR. CLARENCE E. IDE, LOS ANGELES.

On October 3, 1912, Mr. C. R. H., telephone switchboardman, aged 40, consulted me because of the onset of double vision three or four weeks previously.

He reported his father had syphilis. In childhood he had measles, chicken-pox and was very ill at the age of 7, after vaccination—"the worst sickness he ever had." At the age of 18 he had chancres (supposed then to be soft), a papular eruption and "severe sore throat." Has been married fourteen years; has one son who is healthy; wife is well; has had no miscarriages. Reports loss of sexual power to a great extent. Has erection every night (loss of inibition) and finds it necessary to rise from bed for emptying of the bladder.

He gave history of trouble with eyes for twelve or thirteen years. Glasses had been changed frequently during that time—three or four times during the last six years. For some years he had suffered from a "nervous trouble" such that for the last three or four years his knees had been apt to go out from under him. For ten years he had had a "nervous cough in glottis," would cough and cough and then vomit. For five or six years he had suffered from "sour stomach." For eight years had laryngeal spasm so bad that he "would turn blue and drop to the floor"—this once a day or once a week. Gave up work as telephone lineman on account of these attacks.

There have been shooting pains in the legs and through the diaphragm. The left knee used to swell and become painful. Besides, there had been difficulty in controlling the bladder, involuntary micturition occurring at night.

Here is a case presenting a history of chancres, papular eruption, severe pharyngitis, loss of sexual power, chordee, incontinence of urine, Charcot joint, gastric crises, laryngeal crises, lightning pain in legs, band sensation at diaphragm.

Status praesens: I noticed ataxic gait as the man entered the consulting room. For the last three days there has been occipital and supra-orbital pain. For a month there has been double vision. He said: "Doctor, I can see two of you, but I am not drunk."

*This case is reported simply because it presents laryngeal crisis.

There are scars in the pharynx. Examination elicits presence of Romberg's symptom, Argyl-Robertson pupil, ataxia of hands, absence of knee jerk, (patient reported that knee jerks had been absent for 14 years). Patient cannot walk at all with eyes closed, in fact, cannot stand without legs spread apart.

Eyes: Has bulging or "pop" eyes. Fundus normal (physiologic excavation pronounced). Vertical meridian of left eye inclines inward 5 degrees with Stevens' clinoscope. Vertical streak of light with Maddox rod inclines outward before left eye. Left hyperphoria of one degree, exophoria of 6 degrees. With the tropometer right eye moves outward 50 degrees, upward 40 degrees, left eye outward 30 degrees, up 40 degrees, in 60 degrees. Refraction distance: O. D.—.50 sph. with+.25 cyl. at 145°; O. S.—.25 sph. with—.37 cyl. at 180°. Reading: O. D.+2.25 sph. with+.25 cyl. at 145°; O. S.+2.50 sph. with—.37 cyl. at 180°. Diagnosis of monoplegia of the fourth cranial nerve was made and sat. sol K I prescribed at once. Wassermann test made next day was three times positive.

Patient was referred to Dr. Rex Duncan, who instituted treatment at once, making two injections of salvarsan, with intramuscular injection of mercury in the interval and since. On October 7, the clinoscope showed an inward declination of the left eye of only 3 degrees. On January 10, approximately three months after his first visit, the patient presented himself stating there was no longer double vision, but complained of return of laryngeal spasm, stating that the attacks appeared to follow the inhalation of dust. As the middle turbinates presented sensitive areas these were cauterized with chromic acid, to remove reflex irritation. On March 11, patient reported that when he talks fast or gets excited, he becomes "choked up," that he sneezes, coughs and gags all at once in the morning. There had been no attacks of laryngeal spasm.

On April 13, 1913, the patient comes with gait much improved and reporting great increase of weight as well as improvement in all directions.

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SOME INTERESTING ESOPHAGEAL CASES.*

DR. W. P. MILLSPAUGH, LOS ANGELES.

The cases which I shall report are for the most part foreign body cases, in which the esophagoscope was used in the effort to remove the foreign body. In my judgment any other method of attempting to remove most foreign bodies is entirely unjustified except in localities where this method is unavailable.

This specimen, a nine-inch table knife, was taken from the first foreign-body case in which I ever attempted removal. An insane woman had succeeding in getting the knife into her esophagus, I suppose, as a sword-swallower does the trick. The knife stood, handle upward, with its tip about at the cardia. I should like to tell you how I grasped the handle with my forceps and drew the knife out of the esophagus amid the plaudits of the assembled doctors and nurses. But, instead, I am obliged to confess that I not only failed to extract it, but that I passed my tube the whole length of the esophagus and never once recognized the knife. Dr. Alden did a gastrotomy and removed it through the wound. It gives me some cold comfort to excuse this failure by explaining that this was my first case and that the tube I used—the only one I had at that time—was a gastroscope, 80 centimeters long, so that my eye was nearly a yard away from the object. But I am not proud of this case. The patient recovered promptly.

One of my early cases illustrates one of the dangers of esophagoscopy. This was a neurotic man, of about 25, with a history pointing to cardio-spasm. He was given one-fourth grain of morphin with atropin hypodermically and the pharynx was cocainized with about 4 per cent cocain. He was too nervous; I could not make the introduction; so ether was given. He went under nicely, but as the tip of the esophagoscope entered the gullet he ceased breathing and became intensely cyanotic, the pulse becoming extremely feeble. The tube was instantly removed, the head of the table lowered and stimulants applied. For several hours he lay on my office table with flickering pulse and embarrassed respiration, on the very verge of death. Finally I managed to get him into my machine and get him home, more relieved, I think, than I have ever

*Read before the Laryngological Section of the Medical Society of the State of California, April 16, 1913.

felt at any time in my life. The man had a rather flabby heart, but not such as would ordinarily deter one from giving an anesthetic. I suspect that idiosyncrasy to cocain was at least a factor in his collapse; and I would sound a warning note: 10 per cent cocain is freely used in these cases; we must not forget the nature and danger of cocain.

This photograph represents a tooth-plate extracted from a woman's esophagus a month after it was swallowed. The woman was to have a laparatomy; prior to the operation she denied having any false teeth, but when she came out from the anesthetic the two upper median incisors and their plate were missing, while the patient complained of dysphagia. No x-ray picture was taken; the patient was a phlegmatic woman of very moderate intelligence and she got along so well with fluid foods that even at the end of the month some doubt existed as to the presence of the body in the esophagus; but when the 53-centimeter esophagoscope was introduced, under ether anesthesia, the plate was readily found, almost opposite the manubrium of the sternum. The flat surface presented, with the edges well embedded in the swollen mucosa. I failed after several efforts to get hold of an edge, and handed the instruments to Dr. Richardson, who finally got a hook behind the plate and turned it until an edge presented; he then grasped this with the forceps, and tube, forceps and plate were withdrawn together. In spite of the length of time the plate had been in the gullet, in spite of its decidedly sharp corners and edges, and in spite of considerable force used in withdrawing it, the patient immediately recovered.

Tooth-plates are among the frequently swallowed foreign bodies. This specimen is a plate which broke in a man's mouth while he was eating. Before he could recover it, this smaller fragment had got a good start down the esophagus and lodged there. I saw him only a few hours after the accident, and had no difficulty in removing the plate, under ether anesthesia. A short Jackson's esophagoscope, which I had made especially for foreign body work, makes the manipulation much easier.

While on the subject of tooth-plates I will mention two cases which illustrate the ludicrous and pathetic sides of this work. The one case was an old man, of about 65, who felt something hard in his throat while eating and later missed his teeth. He came into the Receiving Hospital and Dr. McCoy and I explored his esophagus carefully without finding any teeth or any evidence of traumatism. He admitted later that he gone to the back door and spit out what

was in his mouth, and as the x-ray failed to locate any teeth we concluded that he probably had found them in the back yard on his return home. This newspaper clipping in regard to this case demonstrates the reporter's idea on this subject, and the advisability of doing this work in some place beyond the reach of reporters. The examination took about twenty-five minutes in all; the reporter describes it as a fishing expedition lasting two hours, and the illustration looks like a 16-candle lamp suspended in the stomach.

The second pathetic case was a poor woman who came fifty miles to me to be relieved of a tooth-plate which she was supposed to have swallowed seven years before. Though the history of this accident and subsequent symptoms was doubtful in the extreme, yet all her trouble since that time had been ascribed to the offending tooth-plate, including a far advanced pulmonary tuberculosis with tuberculosis of the ribs which had necessitated removal of three of the ribs. She brought with her an x-ray print, entirely negative, in which two or three white water splotches in the gastric region had been studied and outlined as probably the teeth. I did not feel justified in exploring, and she went home burdened with disappointment.

Coins are frequently swallowed by children. In many cases the coin passes on and is happily recovered, without recourse to esophagoscopy. But often the coin sticks in the esophagus. Two such cases have come into my hands, and behold my reward—two operations, two fees, total, just twenty-six cents; The first case was a boy of 6, who swallowed the quarter; the coin stuck a few inches below the cricoid where I easily reached it through a short tracheoscope. It slipped from the bite of the forceps just as it came out of the esophagus and I had some trouble in recovering it from behind the soft palate.

The penny was swallowed by a girl between 3 and 4 years of age. I failed in my first effort to recover the coin because I gave up the effort after going down to a point which I thought was well below where the x-ray plate had shown the coin; the child had struggled a good deal and I concluded the coin had been dislodged and carried down. But a second plate showed it still in position, and the second effort was promptly successful. This case demonstrated another of the dangers of esophagoscopy: the child stopped breathing at the instant the coin was drawn from the gullet; artificial respiration was necessary for several minutes before spontaneous respiration was re-established. And this in a robust child!

Fragments of bone are among the most dangerous of foreign bodies; they should be removed at the earliest possible moment. I have had one such case. The patient was an intensely nervous woman from Phoenix; while eating chicken she swallowed a fragment of the wish-bone. I regret that I cannot show you this specimen; it consisted of the central portion of the wish-bone with a short stump on one side; on the other side was a piece about an inch long ending in an extremely sharp point. Fortunately this end was directed downward, which rendered the removal of the body relatively easy and safe. This was done under local anesthesia. The patient recovered promptly. This woman was one of the most grateful patients I have ever had: as I held up the bone for her to see she grasped my hand with hysteric fervor and repeatedly declared her admiring gratitude. This was so intense that she insisted on keeping the bone so that she could have it mounted for me! But alas, for the weakness of human nature! I watched her for several days until all danger was past, and later sent her a modest bill for $50.00. And that's the last I have ever heard from Mrs. H. I didn't even get the bone!

The last case I am reporting, like the first, is not presented because of any sense of personal pride which I feel, but because it has features which are rare if not unique. It is a case of stricture. The patient, a frail girl of about 23, had swallowed a considerable portion of an ounce bottle of pure nitric acid. When first seen by Dr. Clarence Ide, the patient had been fed only by rectum for at least two weeks. She was extremely weak and could swallow nothing. A gastrostomy was imperative, and this was done by Dr. E. C. Moore, after which the patient rapidly gained flesh and strength to a considerable degree. Under Dr. Ide's treatment the horribly injured pharynx, naso-pharynx and fauces slowly healed to a degree where we dared to try to enter the esophagus. At the level of the cricoid the first stricture—or rather the upper end of an almost continuous stricture—was encountered. This admitted a probe about two millimeters in diameter. By means of urethral olivary bougies this was dilated, in several sittings, until it admitted a Lerche esophageal dilator. This admirable instrument materially hastened the dilation at this point, although our efforts to cut and bite away the tough fibrous tissue practically failed. In time I succeeded in passing a 5-millimeter bronchoscope through this upper stricture and down the whole length of the instrument, and later a 7-millimeter bronchoscope. This was not done easily. A very distressing and baffling complication was the condition of the epiglot-

tis; this had been badly damaged and was very rigid; the entrance to the larynx was narrowed, and the folds on either side were so shortened that the epiglottis was drawn back toward the posterior pharyngeal wall in such a manner that when my tube entered the esophagus the concavity of the epiglottis hugged the convexity of the esophagoscope tightly and shut off the patient's breath. Dr. Ide succeeded at times in biting away sufficient scar tissue to temporarily relieve this situation, but usually a recurrence had taken place by the time of the next seance. A further handicap was the girl's condition, miserable at best; one lung was the seat of a slow tubercular lesion. Each sitting had to be followed by an interval of two to six days to allow her to recover strength. All efforts to use silk elastic bougies to maintain the stretching were frustrated by the epiglottis hugging the bougie exactly as it hugged the esophagoscope.

In spite of these difficulties, on two occasions, we succeeded in passing the 7-millimeter bronchoscope down to a point about 10¼ inches from the teeth. Through this whole distance the gullet was strictured to a greater or less degree, the lumen having somewhat the shape of a corkscrew and advance of the instrument being possible only after stretching with the Lerche dilator. At 10¼ inches we encountered a complete occlusion of the esophagus. I estimate from the height of the patient that this point was between four and five inches from the cardia, and I judge that the acid had done its deepest damage at this point because it had been arrested above the cardia by cardio-spasm.

Drs. Ide, Geo. McCoy and I, in consultation, concluded that there was one desperate chance that the complete occlusion might be so short that an instrument passed up from the stomach might act as a sufficient guide for the thrusting of an instrument through the occlusion from above. Dr. Moore consented to attempt the work from the stomach end. Accordingly, the patient was anesthetized, a tracheotomy was done and the bronchoscope was introduced down to the level of the occlusion. At this juncture our work suddenly terminated. As the tube advanced we noticed an area of very marked pulsation on the left anterior aspect of the esophagus and at this point the wall presented a peculiar greyish, translucent appearance. I passed this point, safely as I thought, and came to the face of the occlusion. This time I thought I discovered a slight opening downward; I inserted the dilator and opened it slightly and with very moderate force. Immediately there was a gush of several drachms of fluid; this was odorless and slightly blood-tinged.

Hastily wiping the fluid out of the tube I looked in and was horrified to see an actively pulsating grey body in a cavity—undoubtedly the heart, seen through the ruptured pericardium. Dr. Ide and Dr. McCoy looked and concurred, and we stopped immediately. The foot of the patient's bed was elevated to aid drainage from lungs and esophagus, and we waited for the septic pericarditis to manifest itself. But the temperature remained normal and the patient left the hospital a few weeks later in very fair condition. The latest report was that she was gaining right along.

It is a distinction given to very few men to have looked through the esophagoscope at the pulsating heart. We assure you that it is not a pleasing sight. But if you are inclined to be critical, in the light of the outcome, bear in mind the desperate condition of this woman and the utter futility of the ordinary methods of dilation. Bougies inserted blindly would have failed absolutely, or would have surely perforated the esophageal wall. Any form of guide was out of the question, because the patient could not swallow one single drop of fluid.

I have tried to explain to myself why this patient did not die from septic pericarditis. The most reasonable explanation seems to me that neither the dilator nor the esophagoscope actually penetrated the pericardium, but that the expanding dilator tore an opening in the pericardium through which we looked, and that this opening closed promptly when the instruments were withdrawn. The flow of pericardial fluid from within outward probably helped materially by carrying away the bacteria that must certainly have been carried down from the throat by the instruments.

This patient died after a very few days' illness, four months after this accident. She had been under "Science" treatment during the final months and only an indefinite history of the terminal illness was secured, the chief symptoms being cough and dyspnea. Autopsy showed the pericardium entirely free from acute or chronic inflammation, and the tear could not be definitely located. A double lobar pneumonia was the evident cause of death. The inner surface of the stomach showed an infundibular depression where the cardia should have been. A probe was forced into this for about three-quarters of an inch, where it stopped. Above this point was a solid cord for some inches. The upper portion of the esophagus was so firmly adherent to the vertebrae that it was torn to shreds in removal, and whether any lumen was still present could not be determined.

429 Laughlin Building.

REPORT OF THREE CASES OF OTITIC MENINGITIS TREATED BY DRAINAGE OF THE CISTERNA MAGNA.*

DR. EDWARD BRADFORD DENCH, NEW YORK CITY.

The few remarks which I have to make can hardly be dignified by the title of "a paper." They are simply a report of a personal experience with an operative procedure, proposed just about one year ago, and for which much was hoped. I refer to the drainage of the cisterna magna for the relief of meningitis. The operation is not a new one, as a procedure for draining this region is mentioned by Cunningham (Textbook of Anatomy, 1902, p. 1164). This author not only describes a means of draining the cisterna, but also of opening the fourth ventricle. To Haynes, however, (Transactions of the American Laryngological, Rhinological and Otological Society, 1912), is undoubtedly due the credit of perfecting the technic of this operation, and of bringing it before the profession as a definite procedure for the relief of meningitis.

I simply wish to speak of three cases upon which this operation was performed. It is not necessary to give a detailed history of these cases. I will, therefore, only burden you with a brief resumé of the history in each case:

Case 1: A child, 3½ years of age, had been out of sorts for about a month. A week before I saw the child, there was spontaneous discharge from the left ear. Three days later there was a rise in temperature. For the twenty-four hours immediately preceding my visit, the child had complained of pain in the head and in the left ear, and had cried out at irregular intervals. There was some discharge from the left external auditory canal. An examination of the ear showed a large perforation, involving the entire lower portion of the drum membrane, the mucous membrane of the tympanic cavity being red but not polypoid in character. A bacteriological examination of the discharge showed streptococci; no tubercle bacilli were found in the discharge. There was no tenderness over either mastoid. The right ear was normal. An examination of the child showed slight rigidity of the entire body, but this was not marked. No Babinski sign. Kernig sign present on right side, but not

*Read before the American Otological Society, Washington, D. C., May 6 and 7, 1913.

marked. Knee-jerks absent on each side. No nystagmus, slight internal strabismus, probably congenital. The child had vomited several days ago, but there was no vomiting at the time of my visit. The temperature on admission was 101°, rectal; pulse 108. The case looked like one of tubercular meningitis, and was seen by Doctor Holt in consultation. Doctor Holt thought that on account of the slight elevation of temperature and the absence of mastoid tenderness, a tubercular process was the most probable explanation of the condition. He agreed with me, however, that in the presence of meningeal symptoms and a suppurating ear, in connection with the fact that aural suppuration had evidently been of longer duration than was suspected by the parents,—as proved by the extensive amount of destruction in the drum membrane,—an exploration of the mastoid, with free exposure of the dura, would be advisable.

A complete mastoid operation was immediately done, and all the cells were found infiltrated with fluid. The dura was freely exposed. Over the temporo-sphenoidal lobe and over the left cerebellar lobe the dura was tense. The von Pirquét test was negative. On the day after the operation the temperature fell about a degree, and the rigidity of the body diminished somewhat. On the following day, however, that is, two days after the mastoid operation, the rigidity became more marked, and the temperature rose to 103°. The pulse ranged from 116 to 150, and the respirations were rather high. Owing to the fact that the rigidity had increased, the child was taken to the operating-room, and the cisterna magna drained in the median line, after the Haynes method. The fluid was under considerable pressure. About three or four cubic centimeters of the spinal fluid, mixed with blood, was obtained for pathological examination. This showed no germs, with the exception of one diplococcus. Immediately after the drainage of the cisterna magna, the child seemed to improve somewhat; the rigidity became less and the temperature gradually fell, until, on the third day after operation, it was only 100°. It then, however, began to rise, and the child died seven days after the drainage of the cisterna magna. Some of the spinal fluid evacuated at the time of operation was injected into a guinea pig, and this animal remained perfectly healthy six weeks after inoculation, thus absolutely ruling out the tubercular process, as the cause of the infection.

The case, then, was one of a simple otitic meningitis, following a chronic middle-ear suppuration, and should have been an ideal case for the procedure which we are discussing. That the life of the patient was prolonged by the operation, I believe, but the operation

certainly failed to do more than postpone the fatal termination of the disease.

I might say that, in certain decompression operations, where the subdural space has been drained either in the cerebellar or middle cranial fossa, or in both regions, life has been prolonged for a number of days. I am inclined to think, however, in this case, that the time which elapsed between the drainage of the cisterna magna and the fatal termination of the disease, was rather greater than in most of my cases of decompression operations in the middle cranial fossa.

Case 2: Infant, 5 months old, who was operated on by one of my assistants for a subperiosteal abscess. This child was suffering greatly from malnutrition, and was a poor subject for operation. The temperature on admission was 102°; it fell spontaneously the next day to 100°, and then rose to 104°. An ordinary, simple mastoid operation was performed. The temperature the day after rose to 105.5°, then dropped to 102°. Two days after the operation upon the mastoid the child had several convulsive seizures. The child was taken to the operating-room and the cisterna magna opened in the typical manner. The day after this operation the temperature rose to 106.5°, but then slowly came down, so that in the evening of that day, it was only 100°, and the following day had dropped to normal. After remaining normal for about twenty-four hours, it began to rise and fluctuated between 103.5° and 100° until the child died, four days after the cisterna magna was opened. The infection in this case was streptococcus. The spinal fluid obtained by lumbar puncture was negative on cultivation.

In this second case the operation failed to be of the slightest value; in this instance, also, on tapping the cisterna the cerebrospinal fluid was found to be under considerable pressure. Drainage was perfect until the fatal termination.

Case 3: Boy, aged 8, suffering from a chronic suppurative otitis media for which the ordinary radical operation was performed by one of my assistants. A small area of dura was exposed in the middle cranial fossa. A primary skin graft was applied at the time of operation, and the posterior wound closed in the usual way. The temperature was normal at the time of operation, but immediately began to rise, and on the second day after operation, reached 105°. The posterior wound was opened and the graft removed, but the temperature still continued to rise. The blood culture showed one colony of streptococci at the end of twenty-four hours, but this was the only colony which showed at the end of forty-eight hours. In

other words, the blood was negative. The differential count showed 83 per cent of polymorphonuclear cells on the second day after operation, and 74.8 per cent on the fourth day after operation. The temperature, however, remained high, and the patient gradually sank into a semi-comatose condition. The neck became rigid, the Kernig sign positive; there was no Babinski. Lumbar puncture showed some pus in the cerebro-spinal fluid, no germs present, and culture of the fluid was negative at the end of twenty-four hours. The carbohydrate content of the fluid was practically normal. Globulins were not present.

Owing to the fact that symptoms of meningitis were present, that the chemical examination of the cerebro-spinal fluid was practically normal, and that the fluid was germ-free, it seemed that the case was particularly suitable for drainage of the cisterna magna. This was performed four days after the radical operation. The fluid was under considerable pressure. The ordinary drain was inserted, and the patient returned to bed. The temperature remained high, but the patient seemed somewhat brighter for the next two days. He died, however, on the fourth day after drainage of the cisterna magna.

These three cases would seem to show that we have not yet discovered a surgical procedure which will enable us to combat successfully that dread disease, otitic meningitis. I do not mean to condemn the operation upon the results obtained in such a small number of cases. The operation is easy of performance, and certainly drains the subdural space as effectually as does any other procedure. It is possible that with more extended experience, this operation may be a step toward the solution of the successful treatment of otitic meningitis.

I have nothing to add regarding the technic of the operation, except to say that the elaborate armamentarium, suggested by Doctor Haynes, in his able article, is entirely unnecessary. I have been able to perform this operation with the ordinary mastoid instruments, and to perform it quickly. I believe that the procedure should be given a thorough trial, but the results obtained from my limited experience have certainly not been encouraging.

15 East Fifty-third Street.

TRAUMATIC ATRESIA OF THE EXTERNAL AUDITORY MEATUS OF THE LEFT EAR WITH MASTOID COMPLICATIONS.*

DR. ERNEST DANZIGER, NEW YORK.

Mr. H. B., 28 years of age, bookkeeper, presented himself at my office on December 14, 1911, with the following history: Seventeen years ago, while playing on a railroad track between two freight trains, one car started to move and his head was caught between the bumpers of the cars.

The left half of his face was lacerated and the left ear completely torn off his head. He was carried to the nearest physician, who sewed the parts back into place. Since the accident he had a paralysis of the facial nerve, the middle and the lower branch just slightly reacting. His hearing on that side was decidedly impaired.

Nine days before I saw him he had suffered from an attack of tonsillitis, accompanied by some pain in the affected ear, which since had somewhat abated and varied in its intensity. He had a temperature of 100°, a slight edema behind and almost above the ear, pain upon pressure over the antrum. He hears conversation voice at about five or six feet; Rinné shows increased bone-conduction. He lateralizes tuning-forks toward the affected side. He has no spontaneous nystagmus, a normal rotation reaction of the vestibular apparatus; the caloric test is negative due to some abnormal conditions, which I will point out now:

Inspection shows the left ear about three-quarters of an inch lower than the right one, looking into the meatus shows it absolutely obstructed by an atresia, which has a very minute opening in the uppermost part of the occluding membrane; the lower part of the atresia seems to be bony. The opening just admits the point of a silver probe. There is no discharge.

Not being able to make a clinical diagnosis, I had recourse to differential blood-counts made twelve hours apart, which promptly threw me off the right track: The first blood-count, December 15, 20,000 W., 72 polys; twelve hours later, 13,00 W., 65 polys; twelve hours later, 10,000 W., 60 polys. I assumed the evidence of an acute infection, which was rapidly subsiding and decided on a waiting course.

*Read at the meeting of the Otological Section of the New York Academy of Medicine, February 15, 1912.

December 20: The edema behind ear had slightly increased, no discharge through the fistula in the meatus. Dr. Whiting saw the case in consultation and also corroborated with me in my attitude of waiting. He recommended irrigation through a small cannula.

December 22: Patient had a slight discharge from ear, which can be expressed by pressure over the mastoid.

December 27: After receiving permission from the patient to make a post-auricular incision with the understanding that I could do what I deemed necessary, I found the following condition: The usual curved incision was made, and after pushing back the periosteum I found a large defect in the cortex over the antrum. The latter contained a good-sized cholesteatoma, which extended along the upper posterior border of the petrous portion, almost into the posterior fossa, the cholesteatomatous mass also filled the aditus and partly the tympanum. The drum was destroyed and of the ossicles the incus was found and removed. The dura was exposed at the tegmen tympani. At the time of the accident there must have been a fracture of the bony meatus, the floor of which was very much thickened. The membranous meatus did not lead into the tympanum, but almost terminated in front of the maxillary joint. The fistulous opening just communicated with the floor of the bony meatus.

When attempting the plastic, I found the ear so low that the flaps could not be got into the proper position. I chiselled enough of the hypo-tympanum away so as not to enter the maxillary joint and finally succeeded in packing the flaps against denuded bone, but the cavities cannot be overlooked, as the new meatus runs upward and backward in an angle of more than 45 degrees.

He was discharged with a dry ear on April 20, 1912. On April 22, he had a chill, with temperature of 104° and a redness of the retro-auricular scar. At the same time he developed a spontaneous nystagmus when looking toward the affected side. Ruttin has described such nystagmus as occurring in erysipelas. It is due to a collateral edema of the labyrinth. He developed a severe attack of erysipelas, and when I saw him four weeks later, he had a slight mucoid discharge from the ear, which gradually diminished. His hearing is decidedly better than before the operation. He hears whisper for one-half to one foot; conversation, twelve feet; tuning-fork he does not hear by air-conduction but by bone-conduction, except the high forks.

63 West Ninetieth Street.

INJURIES OF THE LABYRINTH.*

DR. JULIUS AUERBACH, NEW YORK CITY.

Recently I have had a number of cases of labyrinthine trauma come under my observation, two of which I would like to report for the interesting features which they present. Both of these cases were produced by indirect violence; in one the lesion involved the static as well as the cochlear portion of the labyrinth, in the other, the cochlea alone was involved, the static labyrinth remaining in function.

Traumas of the labyrinth are not rare and may be classified chiefly into: (1) direct injuries, such as those produced by a bullet or stab-wound, or accidental injury during operation; and (2) indirect injuries which include those cases in which labyrinthine irritation and degeneration is produced by the action of sudden or continued noises, and also those cases due to a force applied to the bones of the cranium. Clinically these cases offer difficulties in diagnosis at the time of the injury, as the symptoms of labyrinthine disturbance are then masked by the more pronounced symptoms of brain injury, be that a fracture or concussion; it is only when the acute symptoms following the injury have subsided that the local labyrinthine symptoms will make themselves evident. Case 1 illustrates this point.

Case 1: G. P., aged 28. Nine months ago, while riding on a bicycle, he collided with an automobile and was rendered unconscious. He was removed to the hospital where he regained consciousness at the end of thirty-six hours. At this time, according to the patient's story, he was said to have been suffering from a fracture at the base of the skull. He remained in the hospital for three weeks, during which time he suffered from headaches and dizziness and noticed that he could not hear on the right side. Previous to the injury, his hearing was perfect, and he had never suffered from any ear trouble. For two weeks after leaving the hospital he suffered continually from dizziness and had to seek support owing to the marked staggering. These symptoms have gradually disappeared, and now his sole complaint is deafness in the right ear for which he seeks relief.

*Read at the meeting of the Clinical Society of the New York Nose, Throat and Surgical Hospital, March 11, 1913.

Otoscopic Examination:—The drum membranes of both sides are normal in appearance. All the landmarks, including the light reflexes, are present. Both tubes are patent.

Functional Tests:—Left ear: Conversation voice 8 m. +. Whispered speech, 5 m. Acoumeter, 3 m., c^1 and c^4 both heard. Rinné positive. Right ear: Totally deaf to loud voice and noises (tested with the Bárány noise apparatus). Weber, uncertain lateralization. Scarcely any bone-conduction, and then is not certain whether he feels or hears the tuning-fork over the mastoid. Stenger test shows complete unilateral deafness.

Static Labyrinth: No spontaneous nystagmus. No disturbance of equilibrium. Turning ten times to the right = horizontal nystagmus to the left, duration twenty-four seconds. Turning ten times to the left = horizontal nystagmus to the right, duration six seconds. Caloric reaction with cold water left ear, rotatory nystagmus to the right after application of the stream for two and a half minutes. Cold water right ear, same temperature as used in the left and applied for five minutes, no reaction. Pointing test normal.

We have here, then, a case of complete unilateral deafness with complete destruction of the vestibular apparatus, and while nine months have elapsed since the injury, there is no sign of any return of hearing; nor is there any likelihood of there being any return of hearing, because from what we know of the anatomo-pathologic changes which take place in these lesions it is safe to assume that by this time organization with connective-tissue and new bone-formation has taken place.

Less clear and not as well understood are the anatomic changes which take place at the time of injury. The works of Barnick, Lange and Sakai have thrown much light upon the pathological processes that take place in the inner-ear spaces following traumas, as these observers had special opportunities for post-mortem studies on cases of recent injury to the cranium. Before entering into a description of the pathological antomy of labyrinthine traumas I wish to cite the clinical history of another case which came under my observation on the service of Dr. Felix Cohn at the German Hospital.

Case 2: J. B., aged 39, driver of a brewery wagon, and addicted to the free use of alcohol, but with no previous ear trouble of any kind, was pushed and fell to the sidewalk on the back of his head four months ago. He was dazed for a few moments, and on rising to his feet felt dizzy, and staggered and vomited when he reached home. The dizziness and staggering gait lasted for four days and

then gradually disappeared. At this time he noticed that he could not hear on the right ear and experienced whistling noises from the same side Since then he has remained totally deaf on the right side and noises persist.

Otoscopic Examination:—Left ear: External auditory meatus narrowed due to a diffuse external otitis; drum membrane dull; light reflex diminished; pressure in front of the auricle produces pain. Right ear: Drum membrane normal in color; landmarks all present; no undue retraction; both tubes patent. Nasal examination negative. Pharynx congested.

Functional Tests:—Left ear: (Tested with Bárány noise apparatus) Conversation speech 7 m. Whispered speech, 3 m. Acoumeter, 2 m. Weber lateralized to the left. Rinné negative with lengthened bone-conduction; c^1 (sixty-four vibrations) not heard; c^4 positive. Right ear: Totally deaf to loud voice and noises. Rinné is negative infinitive with very much shortened bone-conduction. Watch on the mastoid not heard. c^1 and c^4 not heard. Galton whistle not heard. Stenger test and reading test show complete unilateral deafness.

Static labyrinth: No spontaneous nystagmus. Equilibrium slightly disturbed. Turning ten times to the right = horizontal nystagmus to the left, duration thirty seconds. Turning ten times to the left = horizontal nystagmus to the right, duration twenty-eight seconds. Caloric reaction with hot and cold water, positive.

Here a trauma to the cranium four months ago resulted in complete destruction of the cochlear function of the right side, while the static labyrinth escaped. The two tests which the writer depends upon chiefly in establishing the diagnosis of complete unilateral deafness and also the ones which enable him to rule out the possibilities of simulated deafness or exaggerated deafness are the Stenger test and the reading test with the aid of the Bárány noise apparatus. The former test depends upon the established law that of two tuning-forks of equal number of vibrations, the one held nearer the ear will completely obliterate the sound of the fork held at a greater distance from the ear. As applied clinically, the forks (preferably the small a^1) are struck simultaneously, the patient not knowing that two forks are used. The normal hearing person will hear only the fork which is held closer to the ear. The totally deaf patient will hear the fork from the normal ear although one tuning-fork will be held closer to the deaf ear. The simulator, not knowing that two forks are used, will not hear the tuning-fork from his good ear when one fork is held closer to the side of simulated deaf-

ness, at once disclosing that he must hear from the side to which the fork is closely applied.

In the application of the reading test, the patient is given something to read, and asked to read it in his usual tone of voice. With the noise apparatus applied to the ear the patient unconsciously raises his voice to compensate for the noise made by the apparatus in the ear. With the apparatus going in his deaf ear, this makes no impression upon him whatsoever (if really deaf) and the voice is not raised during reading. It is self-evident that the raising of the voice is performed unconsciously on the part of the patient.

Of the further anatomo-pathological changes of the labyrinthine spaces following injury little was definitely known until comparatively recently, as most of the post-mortems were observed in cases where deafness occurred months or years following the injury. In these cases there were invariably found new-formed connective tissue and bone with more or less obliteration of the normal spaces and secondary degeneration of the cochlear and vestibular nerves. Theodore reported a case where the only microscopic change was that of nerve degeneration with no other sign of injury. From the absence of all other microscopic pathological changes, it seems highly probable that he was dealing with a case of nerve deafness.

In Case 1 there can be little doubt that there was a fracture at the base of the skull involving the petrous portion of the right temporal bone with destruction of the labyrinth and resultant deafness. In less severe injuries, as in Case 2, also with resultant deafness, the cause of this destruction of function of hearing is not quite so clear. The writer can also recall three other cases of head injuries resulting in deafness, in two of which the deafness was well-marked but not complete and only temporary, while in the third, a trauma inflicted on the head of an old lady, 73 years of age, who had been partially deaf, caused her to become totally deaf after the injury. It is now two years since the trauma, and the hearing is *nil*.

Numerous theories have been set up to explain the lesions in those cases where a fracture of the labyrinthine capsule was not demonstrable. Lange is of the opinion that in cases of recent concussion of the labyrinth the anatomical changes are the same as in cases of toxic or infectious neuritis of the eighth nerve. Schwartze thinks that in mild cases of concussion, molecular changes take place in the nerve elements or that a passive hyperemia in the labyrinth is produced as a result of a transitory paralysis of the vaso-motor nerves. Politzer thinks that the anatomic changes are those of hemorrhages in the labyrinth in some cases, while in others there is a paralysis of

the nerve endings. Gradenigo attributes the deafness following trauma to hemorrhages in the labyrinth and especially into the cochlea. Oppenheim places the lesion in the central nuclei of the eighth nerve.

Barnick has found in his histologic examination of temporal bones after recent injuries, blood extravasations into the maculae acusticae and into the vestibular end-plates. The findings of K. Sakai in five cases of recent bilateral fracture of the temporal bone show that in no single case was the bony labyrinthine capsule involved. There were in eight specimens extravasations of blood out of the oval window and in seven specimens extravasations of blood from the round window; in only one instance was there a tear in the ligamentum annulare. In all the cases there were hemorrhages into the vestibular and cochlear branches of the eighth nerve and in addition there were tears in the nervus cochlearis eight times, in the ramus vestibularis, four times. In the membranous portion of the vestibule, the utricle and saccule and in the semi-circular canals there were hemorrhages in five instances.

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62 West Ninety-sixth Street.

Bronchoscopy and Esophagoscopy. A. E. Bulson, *Jour. Ind. State Med. Assn.*, April, 1913.

After briefly discussing the history of bronchoscopy, Bulson enumerates the various instruments, pointing out their individual advantages and disadvantages. He feels that this operation should only be performed in the hospital; in children under 10 years, cocain should be used (10-20 per cent solution). If general anesthesia is required, the combination of oxygen and chloroform is of value. Bulson details aids to diagnosis and reports two cases which present interesting features. Ed.

EDITORIAL DEPARTMENT

LARYNGEAL, BRONCHIAL AND ESOPHAGEAL ENDOSCOPY.

EDITED BY
CHEVALIER JACKSON, M. D.,
PITTSBURG, PA.

Insufflation anesthesia. Every physician has, in his junk closet, instruments that have been tried and found wanting. Prominent among this junk are various sorts of apparatus for anesthesia. With this in mind, we were very skeptical when we first heard of insufflation anesthesia. After witnessing a demonstration by Elsberg, however, we changed our mind and were open to conviction. Having since used Elsberg insufflation anesthesia for bronchoscopy, esophagoscopy, gastroscopy, thyrotomy and some other operations, we cannot withhold our unqualified commendations. Since the discovery of ether anesthesia, no great advance had been made until the insufflation method was developed. In our personal work, we were somewhat prepared by the use of the insufflation of chloroform, as suggested by Dr. T. Drysdale Buchanan, and for certain purposes that cannot be improved upon in bronchoscopy. For esophagoscopy, however, ether insufflation with the Elsberg apparatus introduces an element of safety which has never pertained to esophagoscopy under general anesthesia before, except in the hands of the most skillful. The number of deaths on the table from arrest of respiration during inexpert esophagoscopy under general anesthesia is appalling. This occurred especially in foreign-body cases where the bulk of the tube and the bulk of the foreign body together compressed the trachea when the esophagoscope overrode the foreign body. We are not prepared to advocate the Elsberg anesthesia, or any other method, to overcome the faults of technic in esophagoscopy; but it certainly insures safety, as far as respiratory arrest is concerned, to have a silk-woven catheter in the trachea insuring the supplying of air to the lungs, and assuring the impossibility of complete obliteration of the tracheal lumen, for enough lumen must exist at both sides of the tube to permit the return-flow of air. We do not hesitate to say that for those who wish to use general anesthesia for esophagoscopy that a death on the table is practically impossible with ether insufflation. Of course, the pres-

ence of the catheter in the trachea would render possible trauma by the tube-mouth, but only by the grossest technical faultiness. For gastroscopy, no anesthetic, general or local, is needed to enable the skillful to put the gastroscope into the stomach, but once there, in the absence of the complete relaxation of general anesthesia, the gastroscope remains fixed because of the muscular activity of the diaphragmatic musculature. To gain full relaxation of this musculature and of the abdominal wall, in order that the gastroscope may be freely movable, two things are essential. First, as demonstrated by Henry Janeway, the elevation of the knees of the patient, so that flexion will relax the abdominal wall; and, second, the relaxation of deep general anesthesia. For this second purpose, we can state from actual experience, nothing is equal to the insufflation method with the Elsberg apparatus. Doubtless the other forms of apparatus are equally advantageous, but we speak from personal experience when we mention the Elsberg. Thyrotomy can be readily done under local anesthesia by those who fully understand the technic of infiltration. Much time, however, will be saved by insufflation anesthesia and the strong return-flow keeps the blood and secretions from gaining an entrance to the lower air passages. This return-flow is in every way more advantageous for the purpose than the use of the tampon cannula, or even the excellent plan of Moure using the ordinary cannula with a gauze tampon in place above the cannula. It is surprising how little room the insufflation catheter introduced through the mouth requires in the opened larynx. It lies close along the posterior wall in a region which it is not necessary to invade, because thyrotomy is apt to be unsuccessful in malignancy if the involvement has reached the party wall. Should it be necessary in benign conditions to operate upon this wall it is very easy to displace the catheter sideways. In malignant cases, if it is found that the growth is not removable by thyrotomy and that a laryngectomy is necessary, it is very easy, after amputating the trachea, to insert the insufflation catheter into the cut-end of the trachea and thus carry out a complete laryngectomy with the anesthetist entirely out of the way and with no loss of time. Taking it all in all, Elsberg, Janeway and others who have contributed to the development of insufflation anesthesia have made a very important contribution to the technic of laryngology and doubtless to rhinology as well. An excellent resume of the subject is given in Keen's Surgery, Vol. 6.

Dr. Otto C. Gaub and Dr. W. P. Barndollar, in a recent case, demonstrated the great advantage of the intra-tracheal insufflation

method of anesthesia in an extirpation of a naso-pharyngeal fibroma, which was so large that it pressed the soft palate forward on the tongue and produced dangerous dyspnea. If to this had been added the free flow of blood usual in such cases, the patient would have been asphyxiated. On the contrary, in this case from the moment the insufflation was started the patient's color was good. All blood and clots came back out of the mouth and the operation only required a few minutes because it was uninterrupted. The presence of the catheter in the mouth produced no inconvenience whatever. The day of tracheotomy preliminary to the extirpation of naso-pharyngeal fibromata is past.

Cancer of the Esophagus. A. BASSLER, *Jour. A. M. A.*, April 26, 1913, p. 1283.

A new method of radiographic examination of the esophagus for the early diagnosis of cancer is described. The object is to hold the bismuth in the esophagus by plugging its lower end. A bag filled with water is drawn up tightly against the cardiac orifice, and when this has been accomplished, a mixture of bismuth, acacia and water is run into the esophagus and the radiogram taken. The method is described in detail and illustrated. By this method irregularities of the walls of the gullet can be observed and a diagnosis of carcinoma made before stenosis is present. When stenosis is present the method is not practical or necessary for diagnosis.

Clinical Results of Nasal Treatment in Asthma. W. J. ABBOTT, *Cleveland Med. Jour.*, March, 1913, p. 184.

In all of the forty-four cases of bronchial asthma there was some hypertrophy of the mucosa near or over the middle turbinate; in all but two cases reduction of this hypertrophy resulted in improvement. The author also holds that empyemata of some of the nasal sinuses are directly responsible for the asthmatic symptoms and states that in a large percentage of cases ethmoiditis is present in and has a causal relation to bronchial asthma. Therapy and prognosis are discussed and several cases reported to illustrate the satisfactory results of treatment. ED.

SOCIETY PROCEEDINGS.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Regular Meeting, December 17, 1912.

DR. ROSS HALL SKILLERN, CHAIRMAN.

DISCUSSION OF DR. O'REILLY'S PAPER. . . .

(*Continued from page 880.*)

DR. GEO. M. COATES: Personally I have had no experience with the Kahler instruments, but admire their looks very much. The use of the extension tubes seems to me to be an excellent device. I have had good results with the Jackson tubes, however, and have not been bothered by the small lamps burning out or overheating. The objection that they soon become covered with blood or mucus does not hold good, because the amount of secretion that would obscure the light would also obscure the vision and would have to be mopped out anyhow. I like the new forceps very much, for the old Jackson handle was very imperfect and frequently acted badly.

DR. A. C. H. ROWAND: Dr. O'Reilly's paper and his able demonstration suggest a wide and valuable field of usefulness. It is apropos to the proceeding paper of Dr. Ridpath's on "Papillomas," as it presents a very ready means of reaching and removing them. In Europe it is more often resorted to than in this country, the facilities for operation being greater abroad than at home. When the technic of the application of the bronchoscope has been more fully mastered and its introduction becomes a routine procedure, it would be like turning the search light into Stygean depths where monsters abound in fancied security preying upon poor suffering humanity at their own dire will and pleasure.

It may not be too fanciful to designate as monsters such pathological conditions as papillomas, malignant neoplasms, abscesses (tuberculous or otherwise) hemorrhages, enlarged bronchial glands (often the inviting cause of much distressing cough, foreign bodies, all more or less jeopardizing the life, health and comfort of mankind.

Dr. O'Reilly demonstrates to us that by means of direct bronchoscopy we can observe these conditions, remove, destroy or ameliorate their destructiveness. The case cited in which a tack was lodged in a bronchus of the right middle lobe surrounded by an abscess, in which by introduction of the "scope" the abscess wall was ruptured, allowing the foreign body to be expelled in a subsequent fit of coughing, demonstrates the utility of the bronchoscope. Gangrene of the lung would, in all probability, have followed the continued retention of the tack.

This afternoon I witnessed the extraction of a papilloma by means of the bronchoscope by Dr. O'Reilly. After many and repeated attempts had been made by other means, the spatula was introduced as far as the vocal cords, bringing into view the growth lodged in the posterior commissure. In an easy and leisurely manner, without much discomfort to the patient, the growth was removed in portions, allowing the chords to approximate. The patient (a young girl) had been troubled with almost complete aphonia, and I feel assured that after the subsidence of the irritation the voice will be restored to normal condition.

Safety pins with their points upwards can be removed through the bronchoscope by means of a clever apparatus (Lerche) which throws a loop over the pin, closing it and then extracting it. This speaks well for the bronchoscope and its extensions, as by no other means could the pin

be reached with safety. Hemorrhagic spots can be reached and treated by direct application.

Enlarged bronchial glands can be reduced or removed. Tuberculous foci, malignant growths and other diseased conditions can be brought under direct observation and treatment by means of the "scope" and its extensions. It is evident from the foregoing illustrations that the bronchoscope has come to stay and that many conditions now obscure can be reached and treated with every confidence of successful recovery.

DR. FIELDING O. LEWIS: I have listened with a great deal of pleasure to the paper just presented by Dr. O'Reilly, as I have been especially interested in the use of the Kahler instrument during the past year. The syringe shown by Dr. O'Reilly for the cocainization of the larynx seems to be a very ingenious instrument, which I have not used. I have found, however, that the Sajous forceps, as recommended by Jackson, are very satisfactory.

A point in cocainization that I think very essential, is to thoroughly cocainize the pharynx, its lateral walls, and the base of the tongue, after which the speculum is easily introduced and the larynx sprayed, as Dr O'Reilly described.

In connection with this, I should like to mention an interesting case I saw a few days ago. The patient, a pregnant woman whose time was overdue, was brought to the hospital complaining of having a fish-bone lodged in her throat, the chief symptom complained of by the patient was a sharp cutting sensation, felt in the esophagus, on a line with the upper border of the sternum. Under local anesthesia the Kahler esophagu scope was easily introduced and the bone found sticking in the walls of the esophagus, about midway between the entrance of the esophagus and the stomach. The bone was easily extracted by a simple grasping forcep. My experience has been somewhat limited to foreign bodies in the trachea and bronchi, but I have seen a great many foreign bodies in the esophagus. As to non-malignant growths of the upper respiratory tracts, I have found that some cases are easily removed by the direct method, while others are very difficult and in those cases where the reflexes are hard to abolish, the indirect method, after training the larynx, is most satisfactory.

We have now such a case at the hospital, a man who has a fibroma attached to the right side and almost occluding the lumen of the larynx We were unable to abolish his reflexes sufficiently to introduce the biting forcep or snare by the direct method, but after a few days training of the larynx, we have been able to remove most of the growth by the indirect method.

DR. O'REILLY: In answer to Dr. Lewis, I wish to say that in cases where the reflexes are hard to abolish anesthesia of the pharynx and epiglottis and lateral walls is insufficient. With thorough cocainization of these parts all reflexes should be absolutely abolished for the time being, and the inspection of non-malignant growths or section of malignant growth for pathological examination can be made with ease.

In answer to Dr. Mackenzie, of the preference of the Jackson bronchoscope over the Kahler, I cannot agree with him, as in my experience the field is better illuminated with the Kahler which has its lamp at the proximal end, while the Jackson has it at the distal end, and in my hands the Kahler is very much easier for the operator to handle than the Jackson "scope."

BOOK REVIEWS.

Le l'enrouement chez les chanteurs. Etude physio-pathologique de la voix chante. (Hoarseness in Singers.) By DOCTOR HENRY LAVIELLE, Bordeaux. Pp. 122; A. Destout Aine and Cie, Bordeaux, 1912.

The monograph deals (1) with the physical conditions of the normal singing voice,—its intensity, its pitch, timber and resonance, the various kinds of voices and their classification, the physiological culture of the singing voice; and (2) the treatment of hoarseness,—physical agents of hoarseness, pathological and professional causes, medico-surgical treatment, re-education of the voice, preventive measures, general hygiene. A full bibliography is appended.

Diagnostic et traitement des retrecissements cicatriciels de l'esophage. (Report on Diagnosis and Treatment of Cicatricial Contractions of the Esophagus.) M. GUISEZ, Paris. Presented Oct., 1912, to the Twenty-fifth French Congress of Surgery. Pp. 103, illustrated. Assn. Francaise de Chirurgie, Paris, 1912.

The author calls cicatricial contraction of the esophagus a pathological condition, due to permanent alteration of the tube, characterized by a cicatricial degeneration of the walls with varying progressive symptoms, which tend eventually to complete obliteration of the tube. Next in frequency to cancer of the esophagus, the author regards cicatricial stenosis, and in his book discusses it from various points of view: (1) Diagnostic (clinical and physical symptoms). Esophagoscopy. (2) Therapeutic: Dilatable and non-dilatable cases. Various methods of dilatation: Surgical procedures,—Gastrostomy, external esophagotomy, esophago-gastrotomy.

Le nerf larynge superieur et sa nevrotomie. (Superior Laryngeal Nerve.) Drs. Georges Liebault and Rene Celles, Bordeaux. Pp. 35, with 7 illustrations in the text. Feret et Fils, Ed., Bordeaux, 1913.

The first chapters treat of the anatomy of the L. S., from its origin to its point of entrance into the larynx. The following chapters consider the author's operative technic of exposing the nerve which they divide into the two steps of locating and exposing the external carotid, and locating and exposing the superior laryngeal nerve, its denudation and resection.

The monograph has six clearly executed plates illustrating anatomy and operative procedures.

Les stenoses inflammatoires chroniques de la region cardiaque dû l'esophage. (Chronic Inflammatory Stenoses of the Cardiac Region of the Esophagus.) DR. GEORGES LIEBAULT, Bordeaux. Pp. 132, illustrated, Imprimeries Gounouilhou, Bordeaux, 1913.

In the first section of this book the author considers the anatomy of the inferior portion of the esophagus with particular emphasis on the clinical view.

In the second part chronic inflammatory stenosis forms the subject with emphasis on its pathogenesis, as suggested by the anatomy of the cardiac region. Therapeutic measures applicable to the affection are considered at length. Detailed reports of twenty-seven cases follow, some of which have been elsewhere described in medical literature.